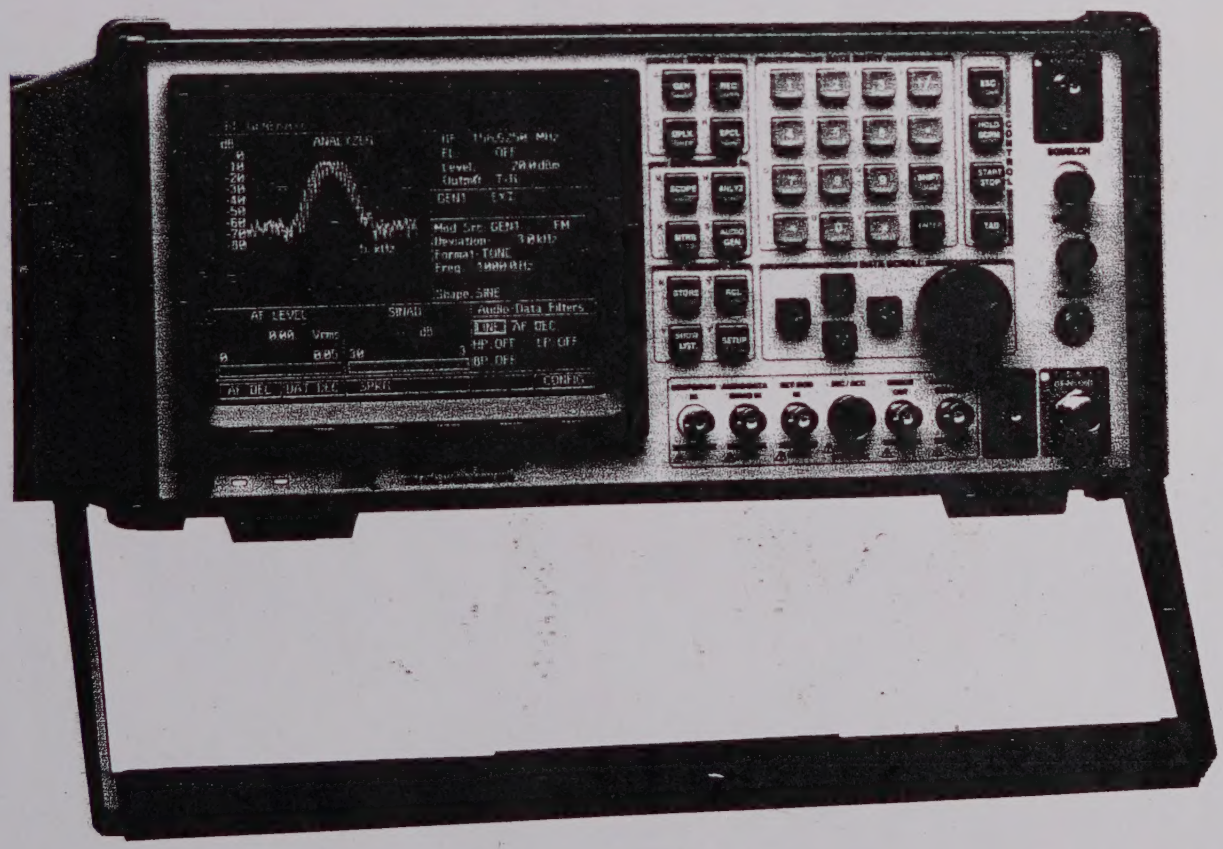
SYSTEMS, INC.

OPERATION MANUAL

COM-120A

COMMUNICATIONS SERVICE MONITOR



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1002-8700-100
VERSION 1.04

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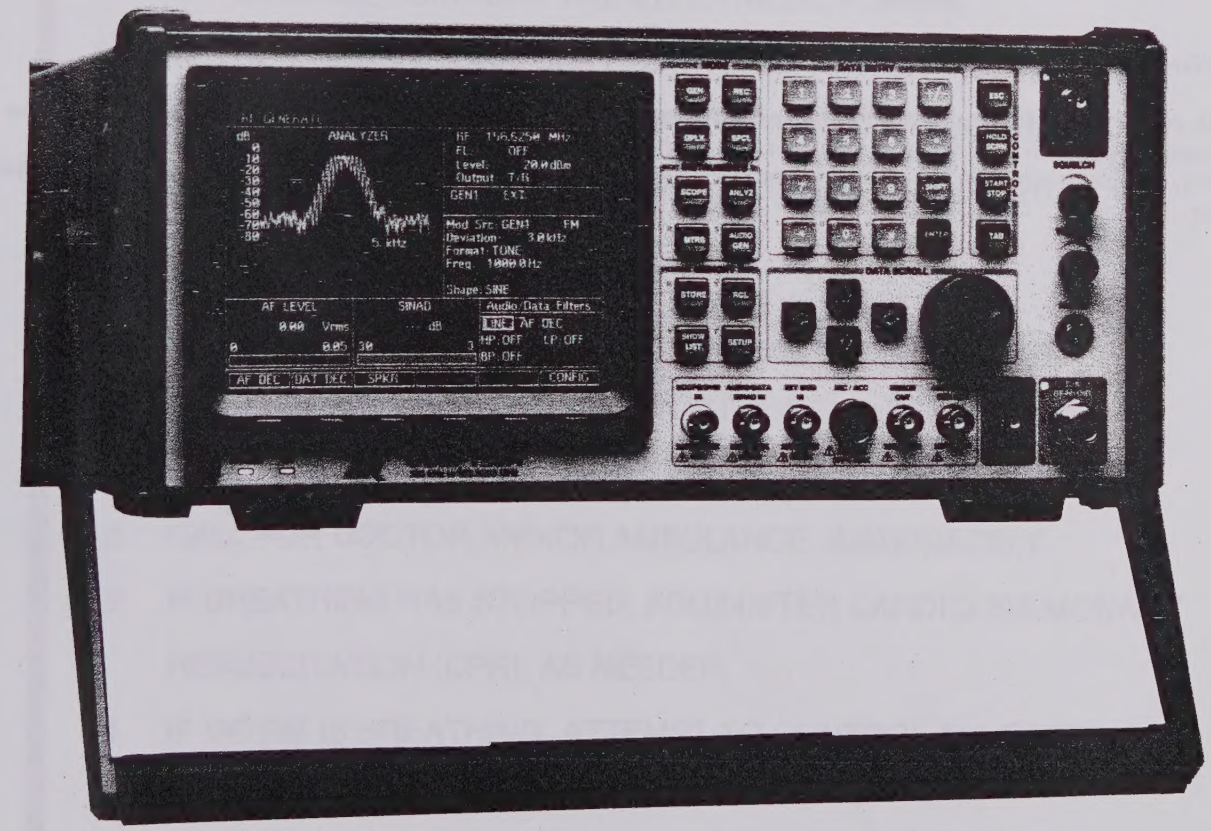

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PUBLISHED BY
IFR SYSTEMS INC
Wichita, Kansas

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WARNING

HIGH VOLTAGE EQUIPMENT

THIS EQUIPMENT CONTAINS CERTAIN CIRCUITS AND/OR COMPONENTS OF EXTREMELY HIGH VOLTAGE POTENTIALS, CAPABLE OF CAUSING SERIOUS BODILY INJURY OR DEATH. WHEN PERFORMING ANY OF THE PROCEDURES CONTAINED IN THIS MANUAL, HEED ALL APPLICABLE SAFETY PRECAUTIONS.

RESCUE OF SHOCK VICTIMS

1. DO NOT ATTEMPT TO PULL OR GRAB THE VICTIM.
2. IF POSSIBLE, TURN OFF THE ELECTRICAL POWER.
3. IF YOU CANNOT TURN OFF ELECTRICAL POWER, PUSH, PULL OR LIFT THE VICTIM TO SAFETY USING A WOODEN POLE, ROPE OR SOME OTHER DRY INSULATING MATERIAL.

FIRST AID

1. AS SOON AS VICTIM IS FREE OF CONTACT WITH SOURCE OF ELECTRICAL SHOCK, MOVE VICTIM A SHORT DISTANCE AWAY FROM SHOCK HAZARD.
2. CALL FOR DOCTOR AND/OR AMBULANCE, IMMEDIATELY.
3. IF BREATHING HAS STOPPED; ADMINISTER CARDIO-PULMONARY RESUSCITATION (CPR), AS NEEDED.
4. IF VICTIM IS BREATHING, ATTEMPT TO CONTROL ALL SERIOUS BLEEDING.
5. KEEP VICTIM WARM, QUIET AND FLAT ON HIS/HER BACK.

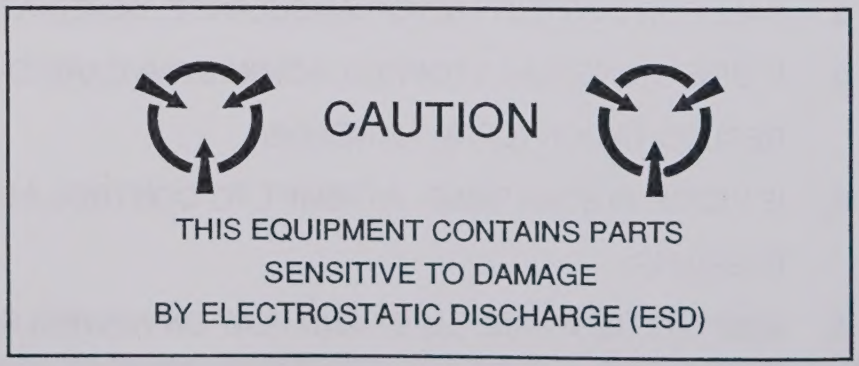
WARNING: DEVICES MUST NOT BE INSERTED NOR REMOVED FROM CIRCUITS WITH POWER ON.

CAUTION: INTEGRATED CIRCUITS AND SOLID STATE DEVICES SUCH AS MOS FETS, ESPECIALLY CMOS TYPES, ARE SUSCEPTIBLE TO DAMAGE BY ELECTROSTATIC DISCHARGES RECEIVED FROM IMPROPER HANDLING, THE USE OF UNGROUNDED TOOLS, AND IMPROPER STORAGE AND PACKAGING. ANY MAINTENANCE TO THIS UNIT MUST BE PERFORMED WITH THE FOLLOWING PRECAUTIONS:

- BEFORE USING A CIRCUIT, KEEP ALL LEADS SHORTED TOGETHER WITH VENDOR-SUPPLIED SHORTING SPRINGS OR BY INSERTING LEADS INTO A CONDUCTIVE MATERIAL.
- GROUND THE HAND BEING USED TO REMOVE DEVICES FROM THEIR CONTAINERS WITH A CONDUCTIVE WRISTBAND. REMOVE ALL METAL JEWELRY BEFORE WORKING WITH DEVICES.
- TIPS OF SOLDERING IRONS, AND ALL OTHER TOOLS, MUST BE GROUNDED WHEN USED.
- PC BOARDS, WHEN REMOVED FROM EQUIPMENT, MUST BE SET ON A GROUNDED CONDUCTIVE MAT OR STORED IN A CONDUCTIVE STORAGE BAG. REMOVE ANY BUILT-IN POWER SOURCE, SUCH AS A BATTERY, BEFORE LAYING PC BOARDS ON A CONDUCTIVE MAT OR STORING IN A CONDUCTIVE BAG.
- PC BOARDS, IF BEING SHIPPED TO THE FACTORY FOR REPAIR, MUST BE PACKAGED IN A CONDUCTIVE BAG AND PLACED IN A WELL-CUSHIONED SHIPPING CONTAINER.

THE USE OF SIGNAL GENERATORS FOR MAINTENANCE AND OTHER ACTIVITIES CAN BE A SOURCE OF ELECTRO-MAGNETIC INTERFERENCE (EMI) TO COMMUNICATION RECEIVERS, WHICH CAN CAUSE DISRUPTION AND INTERFERENCE TO COMMUNICATION SERVICE OUT TO A DISTANCE OF SEVERAL MILES.

USERS OF THIS EQUIPMENT SHOULD SCRUTINIZE ANY OPERATION WHICH RESULTS IN RADIATION OF A SIGNAL (DIRECTLY OR INDIRECTLY) AND SHOULD TAKE NECESSARY PRECAUTIONS TO AVOID POTENTIAL COMMUNICATION INTERFERENCE PROBLEMS.



SAFETY FIRST:
TO ALL OPERATIONS & SERVICE PERSONNEL

READ AND LEARN THESE PAGES IN THEIR ENTIRETY. THE EXPLANATIONS GIVEN APPLY TO BOTH OPERATORS AND SERVICE PERSONNEL AS A MATTER OF SAFETY WHEN USING THIS PRODUCT AND WHEN REFERENCING THIS MANUAL.

REFER ALL SERVICING OF UNIT TO QUALIFIED TECHNICAL PERSONNEL.

SAFETY IDENTIFICATION IN TECHNICAL MANUAL

The following terms are used throughout this manual to draw attention to possible safety hazards, which may exist when operating or servicing this equipment.

CAUTION: THIS TERM IDENTIFIES CONDITIONS OR ACTIVITIES WHICH, IF IGNORED, CAN RESULT IN EQUIPMENT OR PROPERTY DAMAGE (E.G., FIRE).

WARNING: THIS TERM IDENTIFIES CONDITIONS OR ACTIVITIES WHICH, IF IGNORED, CAN RESULT IN PERSONAL INJURY OR DEATH.

SAFETY IDENTIFICATION USED IN EQUIPMENT

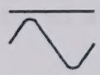
Markings identified with the terms CAUTION and DANGER are to be addressed before accessing that part of the device.

CAUTION: A HAZARD EXISTS WHICH, IF IGNORED, COULD RESULT IN DAMAGE TO THE DEVICE OR PROPERTY. SUCH A MARKING IS NOT LIKELY TO CAUSE PERSONAL INJURY IN THE VICINITY OF THE MARKING.

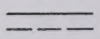
DANGER: A PERSONAL INJURY HAZARD EXISTS AT THE IMMEDIATE PLACEMENT OF THE MARKING ON THE DEVICE. SPECIAL PRECAUTIONS MUST BE OBSERVED WHEN REQUIRED TO PERFORM ANY TASK IN THE VICINITY OF THESE MARKINGS.

SAFETY SYMBOLS IN MANUALS & ON UNITS

INFORMATION PRECAUTION: Corresponds with an applicable item on the device and in the manual. This symbol defines specific voltage, current and power requirements or other related information for safe operation or service of equipment.



AC OR DC TERMINAL: Terminal which may supply or be supplied with ac or dc.



DC TERMINAL: Terminal which may supply or be supplied with dc or direct voltage.

AC TERMINAL: Terminal which may supply or be supplied with ac or alternating voltage.

SWITCH OFF: Ac line power to the device is OFF.

SWITCH ON: Ac line power to the device is ON.

POWER SUPPLY

This device is intended for operation from a power source no more than 120 VAC (North American)/240 VAC (European) at a frequency of 50 to 400 Hz. Power supply specifications are provided within the manual.

EQUIPMENT GROUNDING PRECAUTION

When equipment is connected to ac power, it must be connected to LOAD, NEUTRAL and GROUND inputs at their respective points of contact. Improper grounding of equipment can result in electrical shock anywhere on the device, even if it appears to be insulated.

USE OF PROBES

Check the maximum voltage, current and power ratings of any connector on the equipment in the product specifications prior to connecting it with a probe from a terminal device. Be sure the terminal device performs within these specifications prior to using it for measurement, to prevent electrical shock or damage to the equipment.

POWER CORDS

Power cords are supplied specifically for use with this product for 12 Vdc and 120 VAC operation (U.S.). The power cord must not be frayed, broken nor expose bare wiring when operating this equipment, to prevent electrical shock, fires and to protect your equipment.

USE RECOMMENDED FUSES ONLY

Fuses are provided to prevent electrical fire and for protection of equipment. Use only fuses specifically recommended for the equipment at the specified current and voltage ratings.

OPERATION OF EQUIPMENT IN HAZARDOUS ENVIRONMENT

Do not operate equipment in an explosive environment, out of doors in an electrical storm nor under any other such dangerous circumstances, unless the equipment has been specifically designated for use in such an adverse environment. Environmental requirements are listed with the specifications of this product.

CASE, COVER OR PANEL REMOVAL

Removing protective covers, casings or panels from this product exposes the operator to electrical hazards which can result in electrical shock or equipment damage. Do not operate this equipment with the case, cover or panels removed.

LIST OF EFFECTIVE PAGES

The manual pages listed below which are affected by a current change or revision, are so identified by a revision number and an asterisk.

Date of Issue for original and changed pages are:

Original ..... 0 ..... March 1, 1993

TOTAL NUMBER OF PAGES IN THIS MANUAL IS 550 CONSISTING OF THE FOLLOWING:

Pg. No.	Revision No.	Pg. No.	Revision No.
Title	0	3-222 Blank	0
Copyright	0	3-223 through 3-227	0
Warning	0	3-228 Blank	0
Caution	0	3-229 through 3-240	0
Safety	0	4-1 through 4-117	0
Safety (Power Supply)	0	4-118 Blank	0
A	0	4-119 through 4-121	0
B Blank	0	4-122 Blank	0
i through ix	0	4-123 through 4-140	0
x Blank	0	5-1 through 5-30	0
1-1 through 1-15	0	6-1 through 6-90	0
1-16 Blank	0	A-1 though A-4	0
2-1 through 2-6	0	B-1 through B-3	0
3-1 Blank	0	B-4 Blank	0
3-2 through 3-175	0	C-1 through C-2	0
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PREFACE

SCOPE

This manual contains instructions for operating the COM-120A Communications Service Monitor. The instruction level is relatively basic and presupposes no previous experience on the part of the operator with a communication service monitor of this type. A basic understanding of communication electronics and practical troubleshooting methods is helpful. It is strongly recommended that the operator be thoroughly familiar with this manual before attempting to operate the unit.

ORGANIZATION

The COM-120A Operation Manual is composed of the following sections:

SECTION 1 - INTRODUCTION

Provides an introduction to the unit and a brief overview of unit functions. Specifications are also included in this section.

SECTION 2 - INSTALLATION

Provides a step-by-step procedure for placing the COM-120A into operation.

SECTION 3 - DESCRIPTION OF CONTROLS, CONNECTORS AND INDICATORS

Identifies and functionally describes all COM-120A controls, connectors and indicators. Additionally, all Operation Screens and Menus are identified and available parameters listed and explained.

NOTE: As an operating aid, Figures 3-1 and 3-2, which locate and identify all controls, connectors and indicators, are located on a fold-out page. By extending the fold-out page, the operator can reference any front or rear panel control while simultaneously performing any operating procedure contained elsewhere in the manual.

SECTION 4 - OPERATION

Provides instructions for operating the FM/AM-1600S Mode Operating Screens and Menus. In addition, this section contains a selection of basic operating procedures pertaining to all major functions of the Test Set.

SECTION 5 - REMOTE OPERATION

Provides procedures for configuring and operating the COM-120A remotely. Lists unit specific commands for remote operations as well as commands mandated by IEEE 488.2 1987.

SECTION 6 - OPTIONS

Identifies and provides instructions for operating options available with the COM-120A.

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SECTION 1 - INTRODUCTION

1-1 GENERAL

The COM-120A is a microprocessor controlled, digitally synthesized communication service monitor which combines the operations of many different test instruments into a single, compact unit. Functions the COM-120A is capable of performing include:

- RF Generator
- Full Duplex Operation
- Audio/Data/Signaling Generators
- DVM
- Distortion Meter
- Audio Frequency Meter
- RF Power Meter
- Received Level Meter
- RF Receiver
- Spectrum Analyzer
- Oscilloscope
- Deviation Meter
- SINAD Meter
- Frequency Error Meter
- Modulation Meter

The COM-120A utilizes an alphanumeric keypad, dedicated function keys, multitask "Soft" Function Keys and a high-resolution, monochrome flatpanel display. Testing with this instrument can be done remotely or manually. Microprocessor controlled memory allows storage and recall of parameters for each of the major testing modes as well as storage and recall of Oscilloscope and Spectrum Analyzer traces for signal comparison.

The most important aspect of this instrument is the ability to perform many of the functions listed above simultaneously. There are three basic modes of operation in the COM-120A: RF Generate Operation (see para 1-2), RF Receive Operation (see para 1-3) and Duplex Operation (see para 1-4). What these modes allow the user to perform are the basic operations of generate and receive in duplex and simplex mode, while testing other aspects of the Unit Under Test such as Modulation Level, Power, Sensitivity and Frequency Error.

Additionally, the COM-120A provides the user with several independent test instruments that can be operated while not in the three main Operation Modes. These Instruments include:

Audio/Data/Signaling Generaters (see para 1-5)

Oscilloscope (see para 1-6)

Spectrum Analyzer (see para 1-7)

Meters (see para 1-8)

1-2 RF GENERATE OPERATION

Generating

The COM-120A is capable of generating modulated or unmodulated carrier signals from 250 kHz to 1000 MHz. The output level is variable from -130 to -13 dBm. Modulation types include AM, FM and PM (Phase Modulation) or modulation can be applied from an external source. The COM-120A is capable of generating DTMF, User Defined Tone Codes and Digital Codes.

Meters

Metering functions available for this operation mode include SINAD, Distortion, and Audio Frequency Level. The Oscilloscope and Spectrum Analyzer are also available.

Testing

Tests that can be performed in RF Generate Operation include Receiver Sensitivity, Selectivity, and Audio Frequency Level Measurements. The Tone and Digital Coding capability allows the user to test decode capability for user defined and DCS protocols.

1-3 RF RECEIVE OPERATION

Receiving

The COM-120A is capable of receiving modulated and unmodulated signals from 250 kHz to 1000 MHz. The COM-120A demodulates and detects AM, FM and PM modulated signals. The COM-120A is capable of executing user defined frequency sweep operation and scanning a range of Frequency List settings at predetermined frequencies in addition to single frequency operation. The Receiver accesses "off-the-air" signals through the ANTENNA Connector or connects directly to the Unit Under Test through the T/R Connector.

Meters

Metering functions in the COM-120A, available with the Receiver, include RF Power, AM Modulation, FM Deviation, Phase Modulation, Distortion, Frequency Error, AF Frequency, Received Level and SINAD. The Oscilloscope and Spectrum Analyzer are also available for use.

Testing

Tests that can be performed in RF Receive Operation include Carrier Power measurement, Modulation measurement, Distortion and SINAD measurement and Frequency/Frequency Error measurement. Additionally, the independent Audio/Data/Signaling Generators can be used to modulate the Unit Under Test while performing RF Receive Operation.

1-4 DUPLEX OPERATION

The COM-120A features Duplex Operation from 250 kHz to 1000 MHz. All features available with the RF Generator and Receiver are available in Duplex as well as the ability to use an offset frequency of ±999.7500 MHz. Testing capabilities match those found in RF Generate and RF Receive Operations. Duplex Operation is composed of three Operation Screens with each allowing different testing. The main screen is a Duplex Operation Screen which contains both Receive and Generate Information. Additionally, a Duplex Receive Operation Screen is provided to test the Transmit section of the Unit Under Test and a Duplex Generate Operation Screen is provided to test the Receive section of the Unit Under Test.

1-5 AUDIO FUNCTION GENERATORS

Audio/Tone Coding

The COM-120A has two Audio Generators. One has a range of 10 Hz through 20 kHz and the second has a fixed 1 kHz tone. Available waveforms include sine, square, triangle and ramp.

DATA

The DATA Generator generates in DCS and DCS Inverted formats.

DTMF

The DTMF Generator generates DTMF coding, up to 16 characters long, in burst or continuous mode or configures the DATA ENTRY Keypad as a DTMF Keypad. DTMF Mark and Space timing are programmable as is the time between string transmissions.

1-6 OSCILLOSCOPE

The COM-120A includes a 1 MHz single trace Oscilloscope. The Oscilloscope can operate as a dependent function in each of the Operation Modes as well as an independent function. Both functions give the choice of operation modes of live, store, recall, compare and average. Trigger types available include normalized, auto and one shot.

Dependent

The dependent Oscilloscope shares space in all Operation Modes with the dependent Spectrum Analyzer. Additionally, the Oscilloscope is available with meters. In Generate Operation, sources available for the Oscilloscope are through front panel input connectors, Notch Filter Residual and internal modulation sources. In Receive Operation, sources available for the Oscilloscope are through the front panel input connectors, Audio/Data/Signaling Generators, decode lines, meter lines and the demodulated signal, both filtered and unfiltered. Sweep and scale values differ with each input type.

Independent

The independent Oscilloscope accepts signals only from the SCOPE/DVM Connector. Couplings available include AC, DC and Ground.

1-7 SPECTRUM ANALYZER

The Spectrum Analyzer monitors internal and external signals from 250 kHz to 1000 MHz. Scan widths range from 1 kHz to 1 MHz. Available log scales are 2 and 10 dB per division. Amplitude scale units of dBm, dBμV, dBmV, dBV and dBμW are available in the Independent Spectrum Analyzer and with the Receive Operation. The Generate Spectrum Analyzer is a relative measuring device only and available units are limited to dB. Memory functions for the Spectrum Analyzer include store and recall of a trace, compare a stored trace to a live trace and peak hold. External signals can be "off the air" through the ANTENNA Connector or connected directly to the T/R Connector. The Independent and Receive Function Spectrum Analyzer have attenuation of 0 and 30 dB through both connectors. The Spectrum Analyzer is available for display alone or with all RF Generate and Receive functions except where the Duplex Transmit and Receive functions are shown simultaneously.

Generate Operation

The Generate Operation Spectrum Analyzer is a relative measuring device only and available units are limited to dB. Scan widths range from 1 kHz to 1 MHz and zero scan. Available log scales are 2 and 10 dB per division. Memory functions for the Spectrum Analyzer include store and recall of a trace, compare a stored trace to a live trace and peak hold.

Receive Operation

The Receive Operation Spectrum Analyzer receives signals from 250 kHz to 1000 MHz. Scan widths range from 1 kHz to 1 MHz and zero scan. Available log scales are 2 and 10 dB per division. Amplitude scale units of dBm, dBμV, dBmV, dBV and dBμW are available. Memory functions for the Spectrum Analyzer include store and recall of a trace, compare a stored trace to a live trace and peak hold. Input signals can be "off the air" through the ANTENNA Connector or connected directly to the T/R Connector. The Spectrum Analyzer has 0 and 30 dB attenuation available through both connectors.

Independent

The Independent Spectrum Analyzer receives signals from 250 kHz to 1000 MHz. Scan widths range from 1 kHz to 1 MHz and zero scan. Available log scales are 2 and 10 dB per division. Amplitude scale units of dBm, dBμV, dBmV, dBV and dBμW are available. Memory functions for the Spectrum Analyzer include store and recall of a trace, compare a stored trace to a live trace and peak hold. Input signals can be "off the air" through the ANTENNA Connector or connected directly to the T/R Connector. The Spectrum Analyzer has 0 and 30 dB attenuation available through both connectors. Additional Functions available with the Independent Spectrum Analyzer include a Find function for finding signals above a certain level and split screen giving two Spectrum Analyzer screens.

1-8 METERS

Dependent

The COM-120A provides metering capability in the three Operation Modes. These meters may be in Receive Operation, Generate Operation or both. These meters are available for Simplex and Duplex Operation. These meters may be represented directly on the Mode Operation Screen as numeric readout or as a bar meter and numeric readout. Although a meter may be available in both Receive and Generate Operation, available inputs may differ. Dependent Meters for each Operation Mode are identified below:

Receive Operation	Generate Operation
SINAD	SINAD
Distortion	Distortion
FM Deviation	Audio Level
AM Modulation	
Phase Modulation	
RF Power	
Received Level	
RF Frequency Error	
Audio Counter	

Independent

The COM-120A provides metering capability independent of the Operation Modes. These meters include:

SINAD	Distortion
Audio Counter	Digital Voltmeter

1-9 OPTIONS

Option 01 - Internal Battery

Provides self-contained dc power when external ac or dc power is unavailable.

Option 02 - 0.01 OCXO

Replaces the standard TCXO as system time base. Provides 0.01 x 10^6 accuracy.

Option 03 - 30 kHz IF Filter

Provides additional band limiting between 15 kHz and 300 kHz offered in standard set. Required for AMPS Mobile Station Test (Option 15).

Option 04 - Variable Audio Generator 2

Replaces standard fixed 1 kHz Audio Generator with variable frequency Audio Generator.

Option 05 - Generate Amplifier

Internal RF Amplifier providing 26 dB gain for additional RF output.

1-10 COM-120A PRODUCT SPECIFICATIONS

NOTE: A warm-up time of 5 minutes is required for the following performance requirements.

RF measurements are referenced to 50 Ω.

Accuracy and Resolution stated in percent are referenced to measured or selected value unless otherwise stated.

Where resolution exceeds accuracy, resolution take precedence.

Specifications and features are subject to change without notice.

RF SIGNAL GENERATOR

Frequency

Range:	250.0 kHz to 999.9999 MHz
Resolution:	100 Hz
Accuracy:	Same as Master Oscillator.

Output (T/R and AUX RF Connectors)

Range (T/R):	-130 to -20.0 dBm (Simplex Mode) -130 to -40.0 dBm (Duplex Mode)
Range (AUX):	-130 to -13 dBm
Resolution:	0.1 dB
Accuracy:	±2.0 dB, -20.0 to ≥-90.0 dBm, ≤400MHz, ±2.5 dB, otherwise.
VSWR:	<1.15:1 (0.25 to ≤100 MHz) <1.23:1 (>100 to ≤400 MHz) <1.38:1 (>400 MHz)

Spectral Purity

Residual FM:	<20 Hz (rms, 0.3 to 3.0 kHz Bandwidth)
Residual AM:	<0.5% (rms, 0.3 to 3.0 kHz Bandwidth)
Harmonics:	<-26 dBc
Non Harmonics:	<-50 dBc (≤1000 MHz) <-40 dBc (>1000 MHz)
Input Protection (T/R):	Up to 200 W
(AUX):	Up to 0.25 W

MODULATION

Frequency Modulation

Range:	100 Hz to 100.0 kHz (peak)
Resolution:	100 Hz (<20 kHz deviation) 500 Hz (≥20 kHz deviation)
Rate:	10.0 Hz to 20 kHz, ≤40 kbps for digital data.
Accuracy:	<5% + resolution + residual, (1 kHz rate) (GEN 1, GEN 2, EXT MOD) <10% + resolution + residual, (DATA GEN) <15% + resolution + residual, (DTMF GEN)
Distortion:	<2.0% (1 kHz sine wave, 10 kHz deviation, 0.3 to 3.0 kHz Bandwidth)
EXT MOD Sensitivity:	2 kHz/V_{pk} ±10% (FM Narrow) 10 kHz/V_{pk} ±10% (FM Wide)

Amplitude Modulation

Range:	1% to 99%
Resolution:	1%
Rate:	100 Hz to 10 kHz
Accuracy:	<5% + resolution + residual, (30% - 90% Modulation) (GEN 1, GEN 2, EXT MOD) <10% + resolution + residual, (DATA GEN) <15% + resolution + residual, (DTMF GEN)
Distortion:	<2.0% (1 kHz sine wave, 0.3 to 3.0 Bandwidth)
EXT MOD Sensitivity:	10%/V_{pk} ±10%

Phase Modulation

Range:	0.1 to 10.0 radians (peak)
Resolution:	0.1 radians
Rate:	100 Hz to 6 kHz
Accuracy:	<5% + resolution + residual, (1 kHz rate) (GEN 1, GEN 2, EXT MOD) <15% + resolution + residual, (DTMF GEN)
EXT MOD Sensitivity:	2 rad/V_{pk} ±10%

AUDIO/DATA GENERATORS

A.F. GENERATOR #1

Frequency Range:	5.0 Hz to 20.0 kHz (sine wave only) 5.0 Hz to 10.0 kHz (other wave shapes)
Frequency Resolution:	0.1 Hz
Frequency Accuracy:	Same as Master Oscillator ±0.1 Hz.
Output Range (High Lvl):	0.01 to 2.5 V_{pk} (into 150 Ω)
Output Resolution (High Lvl):	0.01V_{pk}
Output Accuracy (High Lvl):	±3% of rated output ±5 mV_{pk} (≤10 kHz, ≥0.03 V) ±7% of rated output ±5 mV_{pk} (>10 kHz, ≥0.03 V))
Output Range (Low Lvl):	0.1 to 25 mV_{pk} (into 150 Ω)
Output Resolution (Low Lvl):	0.1 mV
Output Accuracy (Low Lvl):	±3% of rated output ±0.25 mV_{pk} (≤10 kHz, ≥1 mV) ±7% of rated output ±0.25 mV_{pk} (>10 kHz, ≥1 mV)
THD:	<0.7% (1 kHz sine wave, 2.5 V_{pk}, 150 Ω Load) <1.0% (all other frequencies)
Wave Shape:	Sine, Square, Triangle, Ramp

A.F. GENERATOR #2

Frequency Range:	1 kHz (sine wave)
Frequency Accuracy:	±0.2 Hz
Output Range (High Lvl):	0.01 to 2.5 V_{pk} (into 150 Ω)
Output Resolution (High Lvl):	0.01 V_{pk}
Output Accuracy (High Lvl):	±3% of rated output ±5 mV_{pk}
Output Range (Low Lvl):	0.1 to 25 mV_{pk} (into 150 Ω)
Output Resolution (Low Lvl):	0.1 mV
Output Accuracy (Low Lvl):	±4% of rated output ±0.25 mV_{pk}

DTMF GENERATOR

Digits:	≤16
Mark/Space Timing:	25 to 999 ms
Mark/Space Timing Resolution:	1 ms

Output Range (High Lvl):	0.01 to 2.5 V_{pk} (into 150 Ω)
Output Resolution (High Lvl):	0.01V_{pk}
Output Accuracy (High Lvl):	±10% of rated output ±5 mV_{pk}
Output Range (Low Lvl):	0.1 to 25 mV_{pk} (into 150 Ω)
Output Resolution (Low Lvl):	0.1 mV
Output Accuracy (Low Lvl):	±10% of rated output ±0.2 mV_{pk}
Modes:	Continuous, Single Shot

RECEIVER

Frequency

Range:	250 kHz to 999.9999 MHz
Resolution:	100 Hz
Sensitivity:	≤2 µV (10.0 dB SINAD, 1.0 kHz Tone, 3.3 kHz Deviation, 15 kHz IF BW, C-Message weighted filter, 10 kHz FM deviation meter range, 15 ≤t (amb) ≤35° C
Antenna Input Protection:	10 W (5 sec with alarm)
Selectivity:	300 kHz, 15 kHz

Adjacent Channel Rejection:

RX BW (3.0 dB)	>30.0 dB Down
300 kHz	±485 kHz
15 kHz	±52 kHz

Demodulation Output

AM:	1.13 Vrms ±0.06 Vrms (80% modulation)
FM:	0.20 Vpk/kHz ±10% (10 kHz range) 0.10 Vpk/kHz ±10% (20 kHz range) 0.04 Vpk/kHz ±10% (50 kHz range) 0.02 Vpk/kHz ±10% (100 kHz range)
ΦM:	0.2 V/Rad ±10%

RF FREQUENCY ERROR METER

Frequency

Meter Range:	0 to ±100.0 kHz
Meter Accuracy:	Same as Master Oscillator ±2 counts

Meter Resolution:	1 Hz (1 sec gate time) 10 Hz (0.1 sec gate time)
RF Level:	0 to 53 dBm (T/R Connector) -60 to 0 dBm (ANTENNA Connector)

AF FREQUENCY COUNTER

Frequency

Range:	10.0 Hz to 20.0 kHz
Accuracy:	Same as Master Oscillator ±1 count
Resolution (1 sec gate time):	0.1 Hz (10 to 500 Hz) 1 Hz (>500 Hz to 20 kHz)
(10 sec gate time):	0.1 Hz
Input Signal Level:	≥90 mV_{pp} (SCOPE/DVM Input, 50 mV range, any waveform) ≥450 mV_{pp} (AUDIO/DATA IN, any waveform)

FM DEVIATION METER

Deviation

Range:	≤±100 kHz (peak)
Resolution:	1% of full scale.
Accuracy:	±5.0% of full scale ±50 Hz ±1 count + source residual (500 Hz to 100 kHz deviation)
Modulation Rate:	10 Hz to 20 kHz
Carrier Range:	250.0 kHz to 999.9999 MHz
Carrier Level:	0 to 53 dBm (T/R Connector) -60 to 0 dBm (ANTENNA Connector)

ΦM METER

Phase

Range:	0.1 rad to 10 rad (peak)
Resolution:	0.01 rad (1 and 2 radian ranges) 0.1 rad (5 and 10 radian ranges)
Accuracy:	±5.0% full scale ±0.1 rad ±1 count + source residual (300 Hz to 6 kHz rate)
Modulation Rate:	100.0 Hz to 6.0 kHz

Carrier Range:	250.0 kHz to 999.9999 MHz
Carrier Level:	0 to 53 dBm (T/R Connector) -60 to 0 dBm (ANTENNA Connector)

AM MODULATION METER

Modulation	
Range:	1% to 100%
Resolution:	0.1%
Accuracy:	±5.0% full scale ±1 count + source residual (30 to 90% depth)
Modulation Rate:	50.0 Hz to 10.0 kHz
Carrier Range:	250.0 kHz to 999.9999 MHz
Carrier Level:	0 to 53 dBm (T/R Connector) -60 to 0 dBm (ANTENNA Connector)
AGC Attack Time:	50 ms

RF POWER METER

Frequency Range:	1.500 to 999.9999 MHz
Input Level	
T/R Connector:	2 mW to 200.0 W
Ranges:	2.0 mW to 200.0 W Full Scale (1 2 5 sequence)
Resolution:	1% of full scale or 0.1 mW
Accuracy:	±10% ±0.1 mW ±one count (15° to 35° C) ±10% ±0.1 mW ±one count (>200 mW, <15° C, >35° C)
VSWR:	1.15:1 (0.25 to 100 MHz) 1.23:1 (100 to 400 MHz) 1.38:1 (>400 MHz to 999.9999 MHz)
Operating Conditions:	50 W continuous (50.0° C) 100 W (90 sec/3 min, 50.0° C) 150 W (30 sec/3 min, 50.0° C) 200 W (15 sec/3 min, 50.0° C)
Alarms:	Audible and visual (if applied power exceeds 200 W in the 200 W range or power term module temperature exceeds 105° C)

RECEIVE LEVEL METER

Frequency Range:	250 kHz to 999.9999 MHz
Input Range:	-101 to -30 dBm (15 kHz IF BW) -80 to -30 dBm (300 kHz IF BW)
Accuracy:	±3 dB

DISTORTION METER

Range:	1% to 20.0%
Resolution:	0.1%
Accuracy:	±0.5% Distortion ±1 count (1.0% to 10.0%) ±2.0% Distortion ±1 count, (>10.0% to 20.0%)
Signal Frequency:	1.0 kHz
Signal Level:	0.03 to 200 Vrms (SCOPE/DVM input) 0.15 to 15 Vrms (AUDIO/DATA input)

SINAD METER

Range:	3 to 30 dB
Resolution:	0.1 dB
Accuracy:	±1.0 dB ±1 count (at 12 dB)
Signal Frequency:	1 kHz
Signal Level:	0.03 to 200 Vrms (SCOPE/DVM input) 0.15 to 15 Vrms (AUDIO/DATA input)

DIGITAL VOLTMETER

Range (DC):	10 mV to 200 Vdc (SCOPE/DVM input)
(AC):	10 mV to 200 Vrms (SCOPE/DVM input) 150 mV to 15 Vrms (AUDIO/DATA input)
Meter Ranges:	50 mV to 200 V (1-2-5 sequence)
Resolution:	3.5 digit
Accuracy:	±5% full scale ±5 mV ±1 count (SCOPE/DVM input) ±7% full scale ±5 mV ±1 count (AUDIO/DATA input)
Frequency:	DC, 50 Hz to 20 kHz
Input Impedance:	1 MΩ (SCOPE/DVM input) 100 KΩ (AUDIO/DATA input)

OSCILLOSCOPE

Vertical Bandwidth (3 dB): 50 kHz

Input

- Ranges: 10 mV to 50 V/Div (1-2-5 sequence)
- Max Input Voltage: 200 V
- Accuracy: ±5% of full scale
- Resolution: 1% of full scale
- Coupling: DC, AC and GND

Horizontal Sweep

- Rate: 100 µs/Div to 100 ms/Div (1-2-5 sequence)
- Accuracy: ±1% of full scale
- Impedance: 1 MΩ

SPECTRUM ANALYZER

Operational Modes: Normal, Split Screen

Frequency Span

- Modes:

Scan Width	Resolution Bandwidth
1 MHz/Div	300 kHz
500 kHz/Div	30 kHz
200 kHz/Div	30 kHz
100 kHz/Div	30 kHz
50 kHz/Div	30 kHz
20 kHz/Div	3 kHz
10 kHz/Div	3 kHz
5 kHz/Div	3 kHz
2 kHz/Div	300 Hz
1 kHz/Div	300 Hz
Zero Scan	30 kHz

- Accuracy: ±5% of Span Width

Level

- Display: Log, 2 and 10 dB/Div
- Vertical Resolution: 1 dB
- Range (Dynamic): 60 dB
- Bandwidth Switching Error: <2 dB

Log Linearity:	±2 dB (referenced to -40 dBm) ±3 dB (≤15 degrees C, ≥35 degrees C)
Input Attenuator:	0 and 30 dB

INPUT/OUTPUT (I/O) CONNECTORS

RS-232 Connector

Operations Mode:	Off, PC (Input/Output), Printer (Output)
Baud Rates:	100, 150, 300, 600, 1200, 2400, 4800, 9600, 19200, 3840
Stop Bits:	1, 2
Parity:	Odd, Even and None
Handshake:	None, Xon/Xoff, CTS/RTS

MASTER OSCILLATOR

TCXO

Frequency:	10 MHz
Temperature Stability:	±0.2 ppm (0 to 50° C)
Aging:	±0.5 ppm per year

POWER REQUIREMENTS

Line Voltage:	90 to 265 VAC (50 to 400 Hz)
DC Input:	10.4 to 32 Vdc
Power Consumption:	85 W (typical DC Operation) 109 W (typical AC Operation)

GENERAL CHARACTERISTICS

Dimensions:	7.3" H, 15.75" W, 16.875" D (w/o bail handle and front panel cover) 7.5" H, 17.32" W, 21.125" D (with bail handle and front panel cover)
Weight:	42 lbs

Display

Type:	EL (Electroluminescent)
Size:	560 column by 400 row (active area of 5.597" x 3.997")
Resolution:	100 dots/in

SECTION 2 - INSTALLATION

2-1 GENERAL

This section contains information on preparing the COM-120A for use. Also listed are installation and operating precautions for safe use of the unit.

2-2 PRECAUTIONS

Before operating this instrument, the operator should be thoroughly familiar with all aspects of this manual.

For operator safety and to prevent damage to this instrument, the following operating precautions should be observed at all times.

WARNING: THE COM-120A MUST BE CONNECTED TO ELECTRICAL GROUND. CONNECT THE FURNISHED AC POWER CORD TO A PROPERLY GROUNDED 3-PIN RECEPTACLE. DUE TO POTENTIAL SAFETY HAZARDS, USE OF THREE-PRONG TO TWO-PRONG ADAPTOR PLUGS IS NOT RECOMMENDED.

CAUTION: THE T/R CONNECTOR WILL ACCEPT NO MORE THAN 200 W. MAXIMUM OPERATION TIME FOR MEASUREMENT USING THE T/R CONNECTOR IS:

CONTINUOUS ON AT 50 W AND 25°C AMBIENT.

90 SEC ON AND 3 MIN OFF AT 100 W AND 50°C AMBIENT.

30 SEC ON AND 3 MIN OFF AT 150 W AND 50°C AMBIENT.

15 SEC ON AND 2 MIN OFF AT 200 W AND 50°C AMBIENT.

MAXIMUM CONTINUOUS INPUT INTO THE ANTENNA CONNECTOR MUST NOT EXCEED .25 W, OR DAMAGE TO THE COM-120A MAY RESULT.

MAXIMUM CONTINUOUS INPUT INTO THE AUX RF OUT CONNECTOR MUST NOT EXCEED 20 V, OR DAMAGE TO THE COM-120A MAY RESULT.

MAXIMUM CONTINUOUS INPUT INTO THE DEMOD CONNECTOR MUST NOT EXCEED 20 V, OR DAMAGE TO THE COM-120A MAY RESULT.

MAXIMUM CONTINUOUS INPUT INTO THE MIC/ACC CONNECTOR MUST NOT EXCEED 20 V, OR DAMAGE TO THE COM-120A MAY RESULT.

MAXIMUM CONTINUOUS INPUT INTO THE EXT MOD CONNECTOR MUST NOT EXCEED 20 V, OR DAMAGE TO THE COM-120A MAY RESULT.

MAXIMUM CONTINUOUS INPUT INTO THE AUDIO/DATA IN CONNECTOR MUST NOT EXCEED 30 V, OR DAMAGE TO THE COM-120A MAY RESULT.

MAXIMUM CONTINUOUS INPUT INTO THE SCOPE/DVM CONNECTOR MUST NOT EXCEED 200 V, OR DAMAGE TO THE COM-120A MAY RESULT.

THIS EQUIPMENT CONTAINS PARTS SENSITIVE TO DAMAGE BY ELECTROSTATIC DISCHARGE (ESD).

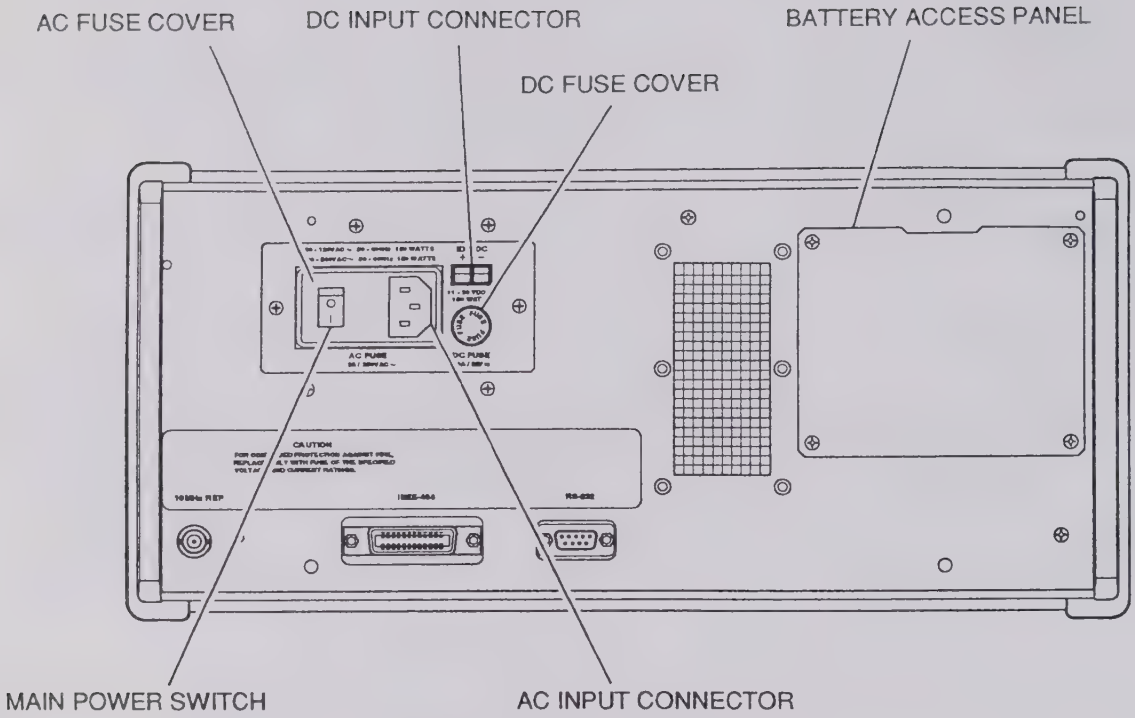


Figure 2-1 COM-120A Rear Panel

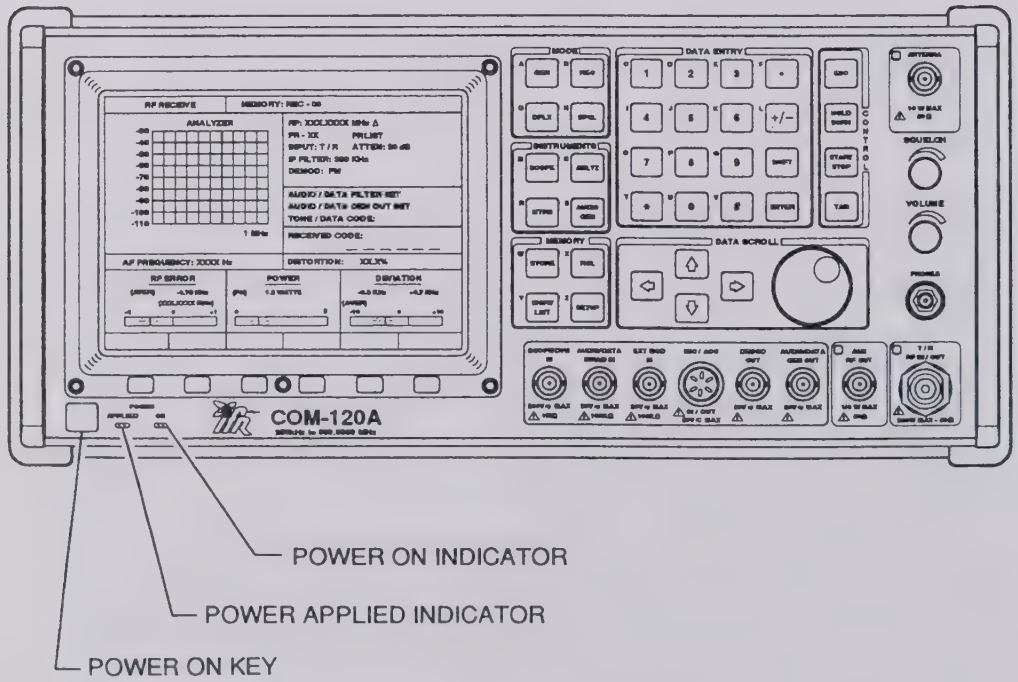


Figure 2-2 COM-120A Front Panel

2-3 POWER UP PROCEDURES

Refer to 2-3-1 for applying ac power, 2-3-2 for applying external dc power and 2-3-3 for operation using internal battery power (requires Option 01). Refer to Figures 2-1 and 2-2 for specific controls, connectors or indicators mentioned.

NOTE: Internal Battery, if installed, charges automatically whenever unit is connected to a power source and Main Power Switch is set to ON.

The Power Supply is designed to sense applied voltage and automatically compensate with no actions required by the operator.

2-3-1 APPLYING AC POWER

STEP	PROCEDURE

1. Insure proper fuse is installed in AC FUSE Housing (see Figure 2-3).

   NOTE: Fuses provided include two 3 A fuses for ac operation.

2. Connect power cord to AC Input Connector (see Figure 2-1).

3. Plug cord into power source. Insure proper grounding.

4. Set Main Power Switch (see Figure 2-1) to ON ("1" on switch). Power APPLIED Indicator (see Figure 2-2) lights when power is available.

6. Press COM-120A Front Panel Power ON Key (see Figure 2-2) to activate unit. Power ON Indicator will lights (see Figure 2-2).

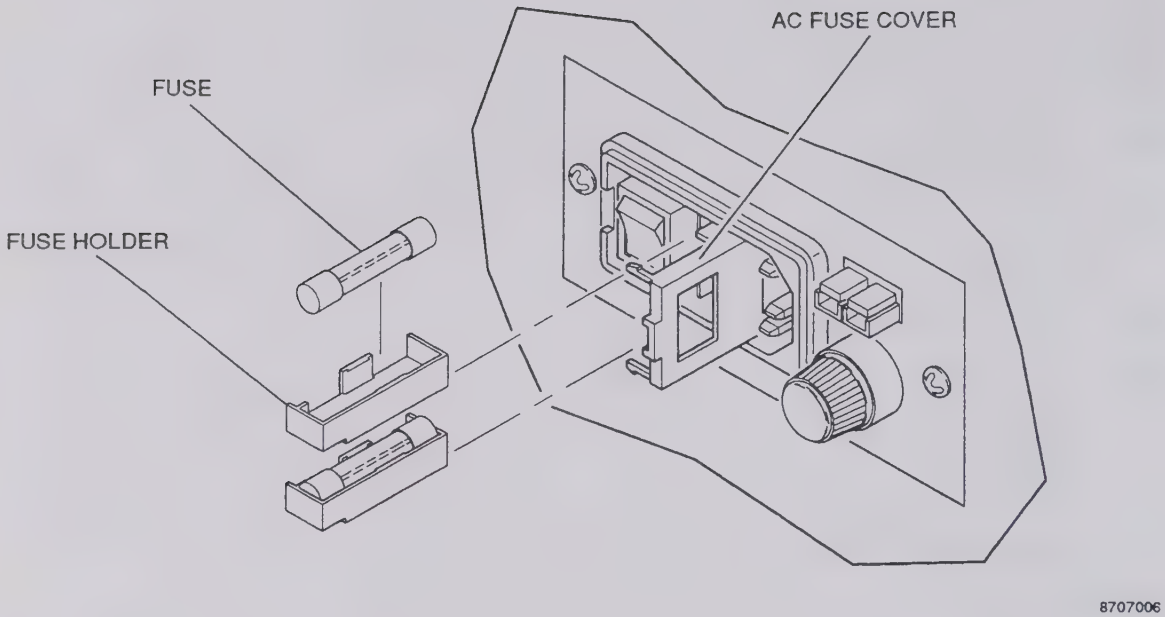


Figure 2-3 AC Fuse Location

2-3-2 APPLYING EXTERNAL DC POWER

STEP	PROCEDURE

1. Insure proper fuse is installed in DC FUSE Housing (see Figure 2-1).

   NOTE: Fuses provided, include a 20 A fuse for dc operation.

2. Connect power cord to DC Input Connector (see Figure 2-1).

3. Plug cord into power source. Power APPLIED Indicator (see Figure 2-2) lights when power is available.

5. Press COM-120A Front Panel Power ON Key (see Figure 2-2) to activate unit. Power ON Indicator lights (see Figure 2-2).

2-3-3 BATTERY POWER OPERATION (OPTION 01)

STEP	PROCEDURE

1. Press COM-120A Front Panel Power ON Key (see Figure 2-2).
2. Power ON Indicator lights (see Figure 2-2).

NOTE: Option 01 required for battery operation.

Power cycles off after approximately 10 minutes of operation.

Flashing Power ON Indicator (see Figure 2-2) denotes low battery charge.

2-4 BATTERY AND BATTERY FUSE REPLACEMENT (OPTION 01)

2-4-1 BATTERY REPLACEMENT

The following procedure should be followed when replacing the battery. Refer to Figure 2-1 for specific controls, connectors or indicators mentioned.

WARNING: THE BATTERY USED IS A LEAD-ACID BATTERY REQUIRING PROPER DISPOSAL FOR DISCARD OF BATTERY. REFER TO APPROPRIATE STATE AND LOCAL REGULATIONS FOR INSTRUCTIONS AS TO PROPER DISPOSITION OF DISCARD BATTERIES.

⚠ **CAUTION:** REPLACE BATTERY WITH IFR PART NUMBER 4000-0000-011 BATTERY ONLY.

NOTE: Option 01 required for battery operation.

Internal Battery, if installed, charges automatically whenever unit is connected to a power source and Main Power Switch is set to ON.

STEP	PROCEDURE

1. Set COM-120A Main Power Switch to OFF ("0" on switch) (see Figure 2-1).
2. Remove all power sources from COM-120A.
3. Loosen 4 Screws on Battery Access Panel (see Figure 2-1). Remove Battery Access Panel
4. Disconnect Positive (+) and Negative (-) Terminals from battery (see Figure 2-4).
5. Remove Battery from cavity.
6. Install replacement battery in cavity.
7. Connect Positive (+) and Negative (-) Terminals to replacement battery. Install Battery Access Panel.

SECTION 3 - CONTROLS, CONNECTORS & INDICATORS

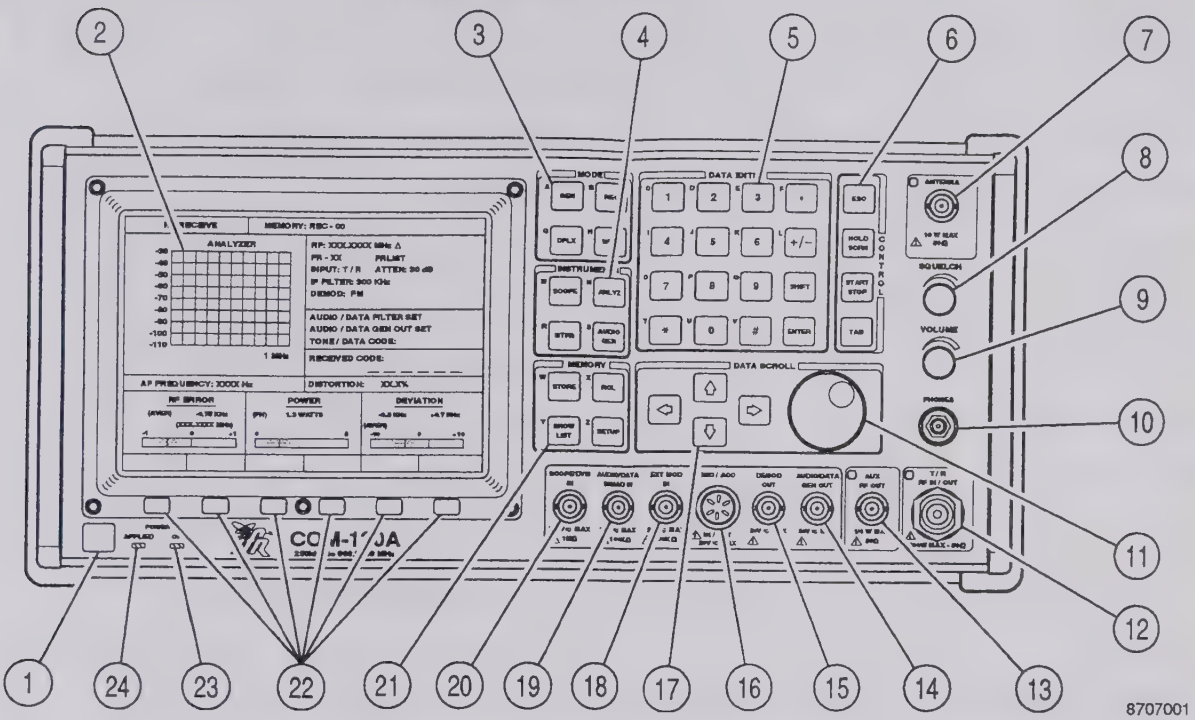


Figure 3-1 COM-120A Front Panel Controls

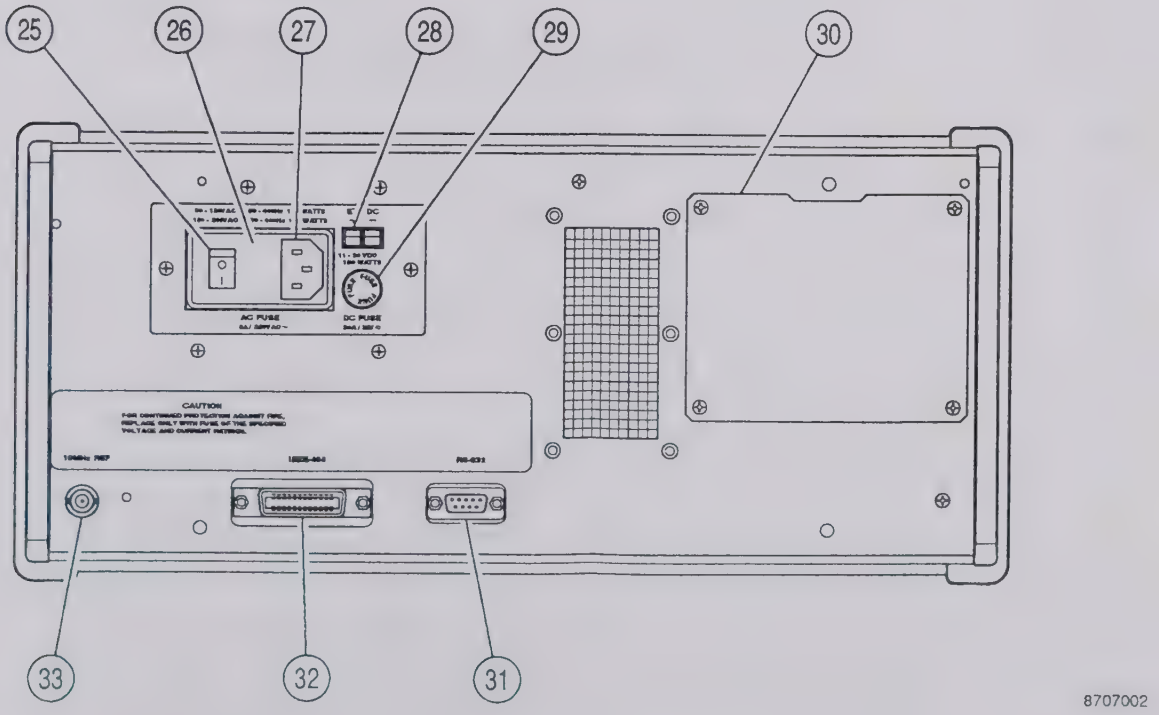


Figure 3-2 COM-120A Rear Panel Controls

1. Power ON Key
2. Display
3. Test Mode Keys
4. Instruments Keys
5. DATA ENTRY Keys
6. CONTROL Keys
7. ANTENNA Connector
8. SQUELCH Control
9. VOLUME Control
10. PHONES Connector
11. DATA SCROLL Spinner
12. T/R Connector
13. AUX RF OUT Connector
14. AUDIO/DATA GEN Connector
15. DEMOD Connector
16. MIC/ACC Connector
17. DATA SCROLL Keys
18. EXT MOD Connector
19. AUDIO/DATA IN Connector
20. SCOPE/DVM Connector
21. MEMORY Keys
22. Soft Function Keys
23. Power ON Indicator
24. Power APPLIED Indicator
25. Main Power Switch
26. AC Fuse
27. AC Input Connector
28. DC Input Connector
29. DC Fuse
30. Battery Access Panel
31. RS-232 Connector
32. GPIB Connector (Option)
33. Reference Connector

3-1 FRONT PANEL CONTROLS

ITEM DESCRIPTION

1. Power ON Key

   Selection toggles between Power APPLIED and Power ON states.

2. Display

   Provides video information to operator of current test operation.

3. Test Mode Keys

   - GEN Test Mode Key
     Accesses GEN (Generate) Test Mode Operation Screen.
   - REC Test Mode Key
     Accesses REC (Receive) Test Mode Operation Screen.
   - DUPLEX Test Mode Key
     Accesses DUPLEX Test Mode Operation Screen.
   - SPECIAL Test Mode Key
     Accesses Optional Operation Modes. Refer to Section 6 for information on available options.

4. Instruments Keys

   - SCOPE Key
     Accesses Oscilloscope Operation Screen.
   - ANLYZ Key
     Accesses Spectrum Analyzer Operation Screen.
   - MTRS Key
     Accesses Independent Meters Functions.
   - AUDIO GEN Key
     Accesses Audio/Data Generators Functions.

5. DATA ENTRY Keys

   - Numeric Keys
     Use to enter numeric (0-9) values.
   - ✻ Key
     Use for DTMF functions.
   - # Key
     Use for DTMF functions.
   - +/- Key
     Use to set sign of entered value.

- • Key
  Use to enter decimal point in numeric values.

- SHIFT Key
  Accesses alphabetic function of Front Panel Keys. Refer to Table 3-1 for a list of shift functions keys.

- ENTER Key
  Selects a data field for edit or completes an editing procedure.

Front Panel Key	Shift Character	Front Panel Key	Shift Character
GEN	A	ANLYZ	N
REC	B	7	O
1	C	8	P
2	D	9	Q
3	E	MTRS	R
+/-	F	AUDIO GEN	S
DPLX	G	*	T
SPCL	H	0	U
4	I	#	V
5	J	STORE	W
6	K	RCL	X
+/-	L	SHOW LIST	Y
SCOPE	M	SETUP	Z

Table 3-1 Shift Characters

6. CONTROL Keys

- ESC Key
  Use to escape an editing procedure without change to parameters.

- HOLD SCRN Key
  Use to freeze current screen for observing data. Once Hold Screen Function is activated, pressing HOLD SCRN Key returns Test Set to normal operation.

- START/STOP Key
  Use to start and stop the following Operating Functions:

  Reset One Shot in Oscilloscope Operation
  Bit Error Rate Meter (Option 07)
  LTR® Trunking (Option 14)

- TAB Key
  Moves cursor to predetermined areas for simplifying editing.

ITEM	DESCRIPTION

7. ANTENNA Connector ⚠

   Input connector to monitor "off-the-air" signals. Also used as a connection for low power (0.25 W maximum) signals.

   CAUTION: MAXIMUM CONTINUOUS INPUT INTO THIS CONNECTOR MUST NOT EXCEED 0.25 W, OR DAMAGE TO THE COM-120A MAY RESULT.

8. SQUELCH Control

   Adjusts squelch level of received signal.

9. VOLUME Control

   Controls volume of speaker.

10. PHONES Connector

    Provides access for using Headphones when audio signal is provided to speaker.

11. DATA SCROLL Spinner

    Allows operator to scroll through current test mode operation screen, scroll through lists of parameter selections and actively increase and decrease one digit of numeric parameters. Current test mode operation screen changes with entered data; changed parameter will not become current default unless ENTER Key is pressed. Pressing ESC Soft Function Key returns changed parameter to previous setting.

12. T/R Connector ⚠

    50 Ω Connector for high power input or output signals.

    CAUTION: MAXIMUM CONTINUOUS INPUT INTO THIS CONNECTOR MUST NOT EXCEED 200 W, OR DAMAGE TO THE COM-120A MAY RESULT.

13. AUX RF OUT Connector ⚠

    50 Ω Auxiliary output connector for signals.

    CAUTION: MAXIMUM CONTINUOUS INPUT INTO THIS CONNECTOR MUST NOT EXCEED 0.25 W, OR DAMAGE TO THE COM-120A MAY RESULT.

14. AUDIO/DATA GEN Connector ⚠

    600 Ω connector for output of audio and data generators. Access is selectable from individual generator setup screens.

    CAUTION: MAXIMUM CONTINUOUS INPUT INTO THIS CONNECTOR MUST NOT EXCEED 20 V, OR DAMAGE TO THE COM-120A MAY RESULT.

ITEM	DESCRIPTION

21. MEMORY Keys

- STORE Key
  Selection allows operator to store current Operation Screen and all current parameters for future access.
- RECALL Key
  Selection allows operator to recall previously stored Operation Screens.
- SHOW LIST Key
  Provides access to menu of all storage lists.
- SETUP Key
  Provides access to setup menu for system information and system configuration.

22. Soft Function Keys

Provides access to defined function.

23. Power ON Indicator

Denotes system is on when lit.

24. Power APPLIED Indicator

Denotes power is provided to the system when lit.

3-2 REAR PANEL CONTROLS

ITEM DESCRIPTION

25. Main Power Switch ⚠

    Switches power applied ON and OFF.

26. AC Fuse ⚠

    Two 30 A fuses are provided for ac operation.

27. AC Input Connector ⚠

    Accepts ac power cord to supply ac power (90 to 265 VAC) to COM-120A.

28. DC Input Connector ⚠

    Accepts dc power cord to supply dc power (12 to 30 Vdc) to COM-120A.

29. DC Fuse ⚠

    20 A 32 V Slo-Blo Fuse is provided for dc operation.

30. Battery Access Panel

    Provides access to battery.

31. RS-232 Connector

    Provides serial interface for remote operations with COM-120A.

32. GPIB Connector (Option)

    IEEE-488 Connector provides parallel interface for remote operations with COM-120A.

33. Reference Connector

    Provides connection for input of external 10 MHz Reference Signal.

3-3 OPERATION SCREENS AND MENUS

3-3-1 RF GENERATE OPERATION SCREEN

The RF Generate Operation Screen is used to define and activate the COM-120A RF Generator. The RF Generate Operation Screen is accessed by pressing the GEN Test Mode Key. Once activated, the COM-120A Display shows a screen similar to Figure 3-3. When accessed, the RF Generate Operation Screen is set up in the configuration last used.

Because of the level of detail required to fully describe the RF Generate Operation Screen, information is split by function into sections. The first section covers the overall screen and refers the operator to other sections for additional information.

Section	Title	Page
A.	RF Generate General Operation Screen	3-10
B.	Modulation Source Block	3-15
C.	Audio/Data Filters Block	3-29
D.	SINAD Meter	3-34
E.	Distortion Meter	3-40
F.	Audio Frequency Level (AF LVL) Meter	3-45
G.	Oscilloscope Operation Screen	3-50
H.	Spectrum Analyzer Operation Screen	3-56
I.	Store and Recall Operation	3-61

A. RF GENERATE GENERAL OPERATION SCREEN

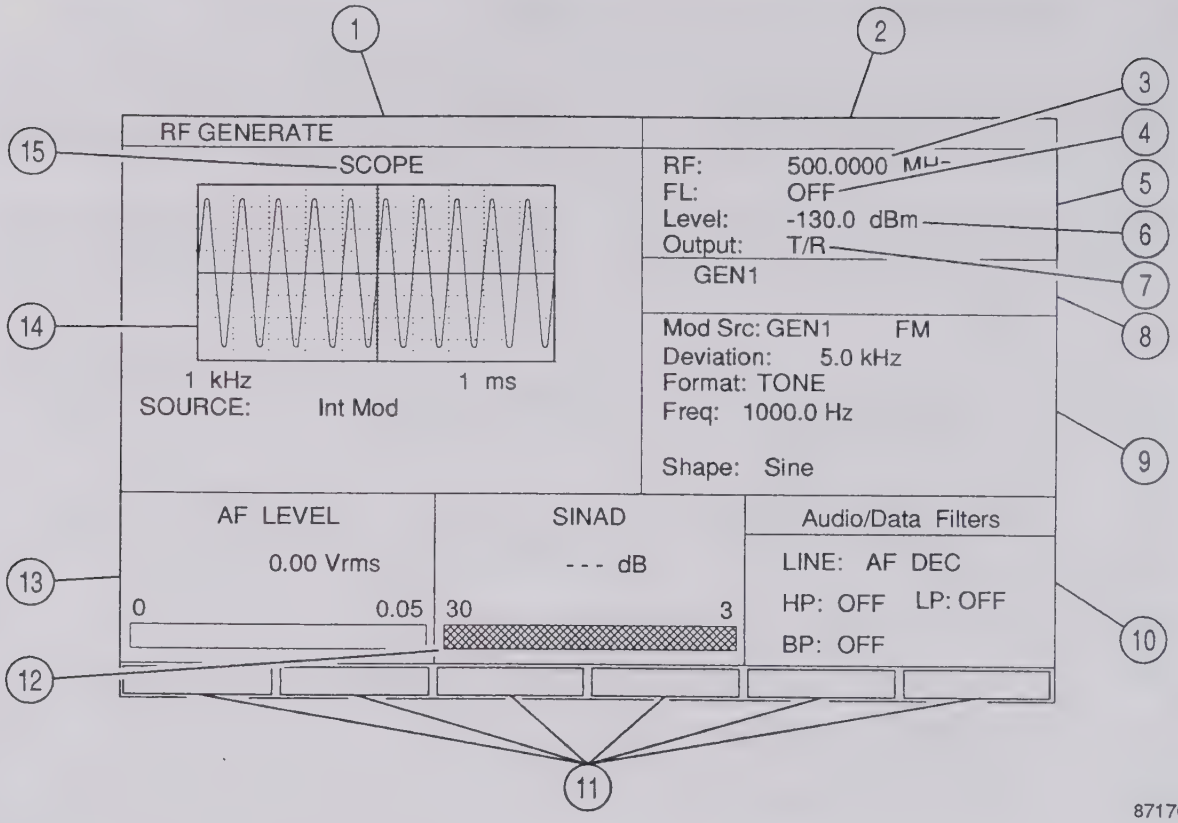


Figure 3-3 RF Generator Operation Screen

ITEM	DESCRIPTION

1. Header Bar

   Displays current operation mode.

2. MEMORY Prompt

   If Stored RF Generate Setup is recalled, displays recalled number (01-99) and Label if used. Blank if RF Generate Operation Screen is in active mode.

3. RF Field

   Displays current RF Generate Frequency from 0.2500 to 1000.0000 MHz.

   Soft Function Keys available with this field include:

   F1 Δ=
   Accesses window to set RF Field change increment(Δ Freq). With Δ= active, Soft Function Keys are defined as follows:

F6 RETURN
Closes window and returns to normal operation.

F2 Δ On/Off
Toggles Δ Function OFF and ON. If Δ Function is active,"Δ" is displayed by Frequency Readout.

F3 SET REF
Changes frequency in current RF Field to reference frequency. RF Field displays offset from reference frequency when activated. If Set Reference Function is active, "R" is displayed.

F4 SWEEP
Accesses menu to configure COM-120A RF Generator to sweep specified frequency range. If Sweep Operation is active, Sweep Prompt is displayed.

NOTE: Set Reference Function and Sweep Function cannot be active simultaneously.

With Sweep Function active, Soft Function Keys are defined as follows:

F1 START
Activates Sweep Function in continuous loop.

F2 STOP
Stops Sweep Function.

F3 SINGLE
Activates Sweep Function for one pass through frequency range.

F5 RESUME
Restarts Sweep Function after STOP Soft Function Key F2 is pressed.

F6 RETURN
Exits Sweep Function into normal RF Generate operation.

F5 LOCK/UNLOCK
Sets frequency used for Receive Operation and Spectrum Analyzer Operation to same frequency as current RF Field. If LOCK Function is active, "L" is displayed and UNLOCK is displayed for F5 definition. Pressing F5, when UNLOCK is displayed, toggles LOCK Function OFF. Editing Frequency in any Operation Screen is reflected in all three Operation Screens when Lock Function is engaged.

4. FL (Frequency List) Setting

Displays selected Frequency List number (FL-00 to FL-99) when active. Blank if inactive. RF Field (3) echoes frequency of selected Frequency List setting. Editing RF Field (3) deactivates Frequency List Function.

Soft Function Keys available with this field include:

F1 On/Off
Toggles active function On and Off.

F2 T-Fwd
Accesses Trunking-Forward Channel List.

F3 T-Rvs
Accesses Trunking-Reverse Channel List.

F4 C-Fwd
Accesses Cellular-Forward Channel List.

F5 C-Rvs
Accesses Cellular-Reverse Channel List.

F6 FL
Accesses User Defined Frequency List. Refer to para 3-3-8(A) for information on editing User Defined Frequency List.

5. Frequency List Label

Displays optional Frequency List Label. Blank if Frequency List Label is not used.

6. Output Level

Displays Output Level in selected units. If T/R Connector is selected for Output (7) range is -130 to -20 dBm, .07 to 22360.6 µV, 0.0000 to 22.3606 mV and 0.000000 to 0.022360 V. If AUX RF Connector is selected for Output (7) range is -130 to -13 dBm, .07 to 50059.3 µV, 0.0000 to 50.0593 mV and 0.000000 to 0.050059 V.

Soft Function Keys available with this field include:

F1 dBm
Sets Output Level Units to dBm.

F2 uV
Sets Output Level Units to µV.

F3 mV
Sets Output Level Units to mV.

F4 V
Sets Output Level Units to V.

F5 SINAD=
Access field to set SINAD Search Function value.

F6 S=On/Off
Toggles SINAD Search Function ON and OFF. SINAD Search Function changes Output Level to search for SINAD= value from UUT. S= Prompt is displayed with function ON.

7. Output

Displays connector selected for output. Displays T/R, T/R Gate, AUX or AUX Gate. If Gate Output is selected, output is active only when microphone attached to MIC/ACC Connector is keyed. Default output connector is T/R Connector.

Soft Function Keys available with this field include:

F1 T/R
Selects T/R Connector as output connector with T/R Connector Indicator lit.

F2 AUX
Selects AUX RF OUT Connector as output connector with AUX RF OUT Connector Indicator lit.

F3 T/R Gate
Selects T/R Connector as output connector with T/R Connector Indicator lit. Output is active only when microphone attached to MIC/ACC Connector is keyed.

F4 AUX Gate
Selects RF AUX Connector as output connector with AUX RF OUT Connector Indicator lit. Output is active only when microphone attached to MIC/ACC Connector is keyed.

8. Modulation Source Window

Displays active Modulation Sources. Inactive Modulation Sources are not shown.

9. Modulation Source Block

Displays selected Modulation Source and appropriate data. Selections include GEN1 (Audio Generator 1), GEN2 (Audio Generator 2), DTMF (DTMF Tone Generator), DATA (DATA Generator), EXT (External Modulation) and MIC (Microphone Modulation). Refer to para 3-3-1(B) for additional information on Modulation Source Blocks.

10. AUDIO/DATA FILTERS Block

Displays current filter information for selected analog signal. Selections include AF Decode Line, Data Decode Line and Speaker/Headphones Line. Refer to para 3-3-1(C) for additional information on Audio/Data Filters.

11. Soft Function Key Definitions

Functions are redefined with each field of the current operation screen.

12. SINAD/Distortion Meters

Displays selected Meter Operation. Selections are SINAD or Distortion Meters. Refer to para 3-3-1(D) for description of SINAD Meter. Refer to para 3-3-1(E) for description of Distortion Meter.

Soft Function Keys available with this field include:

F1 ZOOM
Expands current meter into full-size meter.

F2 SINAD
Selects SINAD Meter as active meter. Not displayed if meter is active.

F3 DIST
Selects Distortion Meter as active meter. Not displayed if meter is active.

13. AF LVL METER

Displays AF LEVEL METER Operation. Refer to para 3-3-1(F) for description of Audio Frequency Level Meter.

Soft Function Keys available with this field include:

F1 ZOOM
Expands current meter into full-size meter.

14. SCOPE/ANALYZER Screen

Displays digitized trace of specified signal as Oscilloscope or Spectrum Analyzer.

15. SCOPE/ANALYZER PROMPT

Displays current operation function. Used to toggle between two functions. Refer to para 3-3-3(G) for information on RF Generator Oscilloscope Operation and para 3-3-1(H) for information on RF Generator Spectrum Analyzer Operation.

Soft Function Keys available with this field include:

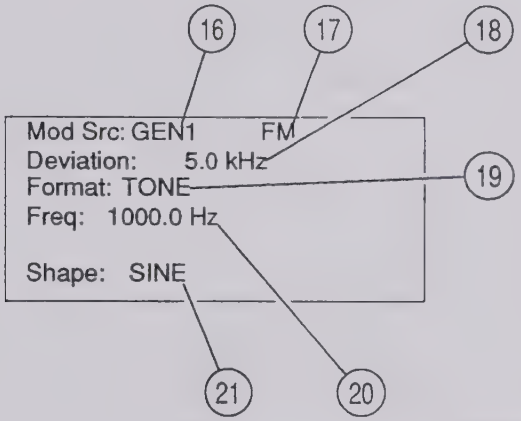
F1 ZOOM
Accesses expanded version of active function.

F2 ANALY/SCOPE
Accesses inactive function. If SCOPE is active, displays ANALY. If ANALYZER is active, displays SCOPE.

B. MODULATION SOURCE BLOCK

The Modulation Source Block displays selected Modulation Source and appropriate data. Selections include GEN1 (Audio Generator 1), GEN2 (Audio Generator 2), DTMF (DTMF Tone Generator), DATA (DATA Generator), EXT (External Modulation) and MIC (Microphone Modulation). The Modulaton Source Block contains different information for each Modulation Source.

With GEN1 selected as Modulation Source, the Modulation Source Block is defined as follows:



ITEM	DESCRIPTION

16. Modulation Source

Displays selected Modulation Source. Selections include GEN1 (Audio Generator 1), GEN2 (Audio Generator 2), DTMF (DTMF Tone Generator), DATA (DATA Generator), EXT (External Modulation) and MIC (Microphone Modulation).

Soft Function Keys available with this field include:

F1 GEN1
Accesses Audio Generator 1 parameters.

F2 GEN2
Accesses Audio Generator 2 parameters.

F3 DATA
Accesses DATA Generator parameters.

F4 DTMF
Accesses DTMF Generator parameters.

F5 EXT
Accesses External Modulation parameters.

F6 MIC
Accesses MIC Modulation parameters.

17. Modulation Type

Displays selected Modulation Type. Selections include OFF, AM, FM and PM.

Soft Function Keys available with this field include:

F1 OFF
Turns Modulation Source (16) OFF.

F2 AM
Selects AM as Modulation Type for Modulation Source (16).

F3 FM
Selects FM as Modulation Type for Modulation Source (16).

F4 PM
Selects PM as Modulation Type for Modulation Source (16).

18. Deviation/Modulation Level

Displays selected Deviation in kHz if current Modulation Type (17) is FM with range from 0.0 to 100 kHz. Displays selected Percent Modulation if current Modulation Type (17) is AM with range from 0% to 100%. Displays selected Deviation in radians if current Modulation Type (17) is PM with range from 0 to 10 Radians. Field is not displayed if Modulation Type (17) is OFF.

19. Format

Displays Format type for GEN1 Modulation Source (16). Selections available with standard COM-120A include:

10 PS	20 PS	TONE
USER		

Additional selections are shown, but are unusable unless Option 09 or Option 11 is installed. Refer to Section 6 for information on Options. Additional selections available include:

Soft Function Keys available with GEN1 include:

CCIR	CCIRH	CCIRH4
EEA	EIA	NATEL
ZVEI	DZVEI	DDZVEI
EURO	5/6 TONE	

F1 MENU
Accesses menu for selecting Format.

F2 CONT
Activates continuous transmission of selected signal.

F3 BURST
Activates single transmission of selected signal. If TONE is selected as format, activates tone of duration specified by TIME Soft Function Key F4.

Additional Soft Function Keys available when USER is selected as Format include:

F4 CONFIG
Accesses Configuration Window for configuring User Selectable Frequency and Duration for codes 0 through 9 and A through T. With Configuration Window active, Soft Function Keys are defined as follows:

F1 PG UP
Used to scroll up through Configuration Window.

F2 PG DN
Used to scroll down through Configuration Window.

F3 FILL
Fills remainder of selected column with value of current cursor position.

F6 RETURN
Exits Configuration Window into normal RF Generate operation.

Additional Soft Function Keys available when TONE is selected as Format include:

F4 TIME
Accesses Window for setting BURST Function duration. Duration ranges from 0 to 30 Seconds. With Configuration Window active Soft Function Keys are defined as follows:

F6 RETURN
Exits Time Window into normal RF Generate operation.

20. Tone Freq

Displays selected Audio Tone Frequency of current Modulation Source.

21. Shape

Displays selected Wave Shape of Modulation Source. Selections include SINE, SQUARE, RAMP and TRIANGLE. Active only with TONE selected as Format (19).

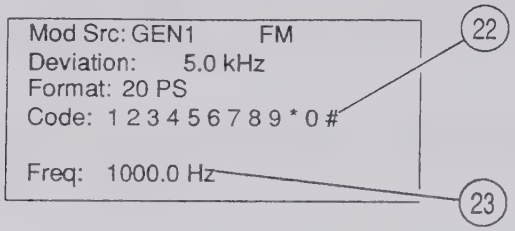
Soft Function Keys available with this field include:

F1 SINE
Selects SINE as active Wave Shape.

F2 RAMP
Selects RAMP as active Wave Shape.

F3 TRIANGLE
Selects TRIANGLE as active Wave Shape.

F4 SQUARE
Selects SQUARE as active Wave Shape.



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22. Code

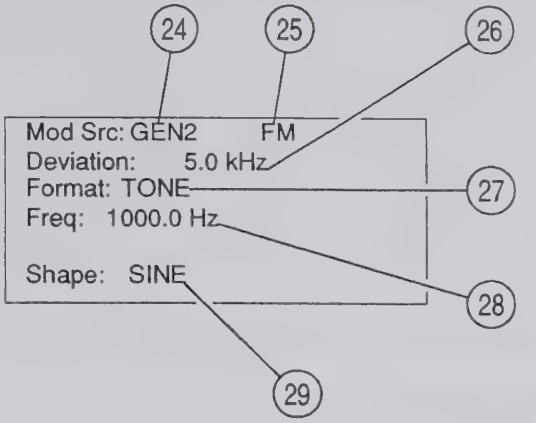
Displays selected code for specified Format (19). Not used with TONE as Format (19).

F1 CLEAR
Clears current CODE entry.

23. Pulse Freq

Displays selected Pulse Frequency of 10 PS and 20 PS settings for Format (19). Displayed only with Option 09 installed.

With GEN2 selected as Modulation Source, the Modulation Source Block is defined as follows:



ITEM	DESCRIPTION

24. Modulation Source

Displays selected Modulation Source. Selections include GEN1 (Audio Generator 1), GEN2 (Audio Generator 2), DTMF (DTMF Tone Generator), DATA (DATA Generator), EXT (External Modulation) and MIC (Microphone Modulation).

Soft Function Keys available with this field include:

F1 GEN1
Accesses Audio Generator 1 parameters.

F2 GEN2
Accesses Audio Generator 2 parameters.

F3 DATA
Accesses DATA Generator parameters.

F4 DTMF
Accesses DTMF Generator parameters.

F5 EXT
Accesses External Modulation parameters.

F6 MIC
Accesses MIC Modulation parameters.

25. Modulation Type

Displays selected Modulation Type. Selections include OFF, AM, FM and PM.

Soft Function Keys available with this field include:

F1 OFF
Turns Modulation Source (24) OFF.

F2 AM
Selects AM as Modulation Type for Modulation Source (24).

F3 FM
Selects FM as Modulation Type for Modulation Source (24).

F4 PM
Selects PM as Modulation Type for Modulation Source (24).

26. Deviation/Modulation Level

Displays selected Deviation in kHz if Modulation Type (25) is FM with range from 0.0 to 100 kHz. Displays selected Percent Modulation if Modulation Type (25) is AM with range from 0 to 100%. Displays selected Deviation in radians if Modulation Type (25) is PM with range from 0 to 10 Radians. Field is not displayed if Modulation Type (25) is OFF.

27. Format

Displays Format type for Modulation Source (24). Selections for standard GEN2 are limited to TONE.

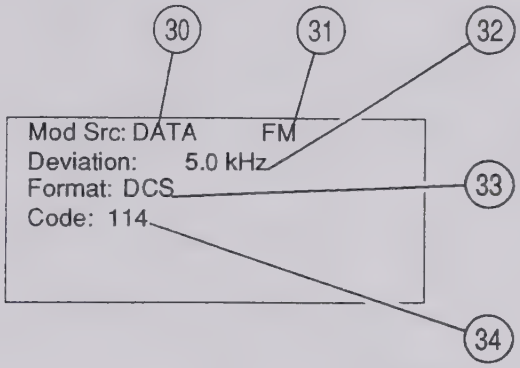
28. Tone Freq

Displays selected Audio Tone Frequency of current Modulation Source. Standard GEN2 is limited to 1 kHz tone.

29. Shape

Displays selected Wave Shape of Modulation Source. Limited to SINE only with standard GEN2.

With DATA selected as Modulation Source, the Modulation Source Block is defined as follows:



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ITEM	DESCRIPTION

30. Modulation Source

Displays selected Modulation Source. Selections include GEN1 (Audio Generator 1), GEN2 (Audio Generator 2), DTMF (DTMF Tone Generator), DATA (DATA Generator), EXT (External Modulation) and MIC (Microphone Modulation).

Soft Function Keys available with this field include:

F1 GEN1
Accesses Audio Generator 1 parameters.

F2 GEN2
Accesses Audio Generator 2 parameters.

F3 DATA
Accesses DATA Generator parameters.

F4 DTMF
Accesses DTMF Generator parameters.

F5 EXT
Accesses External Modulation parameters.

F6 MIC
Accesses MIC Modulation parameters.

31. Modulation Type

Displays selected Modulation Type. Selections include OFF, AM, FM and PM.

Soft Function Keys available with this field include:

F1 OFF
Turns Modulation Source (30) OFF.

F2 AM
Selects AM as Modulation Type for Modulation Source (30).

F3 FM
Selects FM as Modulation Type for Modulation Source (30).

F4 PM
Selects PM as Modulation Type for Modulation Source (30).

32. Deviation/Modulation Level

Displays selected Deviation in kHz if current Modulation Type (31) is FM with range from 0.0 to 100 kHz. Displays selected Percent Modulation if current Modulation Type (31) is AM with range from 0% to 100%. Displays selected Deviation in radians if current Modulation Type (31) is PM with range from 0 to 10 Radians. Field is not displayed if Modulation Type (31) is OFF.

33. Format

Displays Format type for Modulation Source (30). Selections available with DATA include DCS and DCS/ (DCS Inverted).

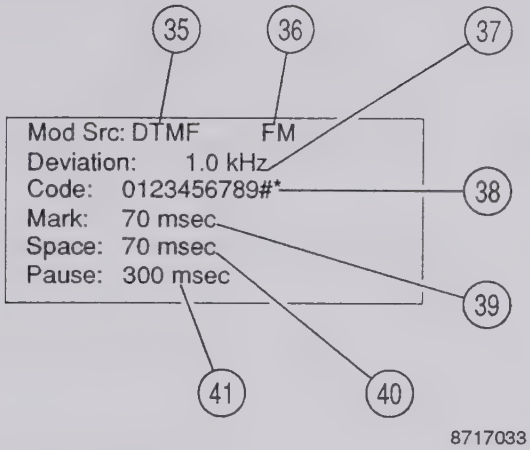
Soft Function Keys available with this field include:

F1 Menu
Accesses menu for selecting Format.

34. Code

Displays selected code for DATA Modulation Source.

With DTMF selected as Modulation Source, the Modulation Source Block is defined as follows:



ITEM	DESCRIPTION

35. Modulation Source

Displays selected Modulation Source. Selections include GEN1 (Audio Generator 1), GEN2 (Audio Generator 2), DTMF (DTMF Tone Generator), DATA (DATA Generator), EXT (External Modulation) and MIC (Microphone Modulation).

Soft Function Keys available with this field include:

F1 GEN1
Accesses Audio Generator 1 parameters.

F2 GEN2
Accesses Audio Generator 2 parameters.

F3 DATA
Accesses DATA Generator parameters.

F4 DTMF
Accesses DTMF Generator parameters.

F5 EXT
Accesses External Modulation parameters.

F6 MIC
Accesses MIC Modulation parameters.

36. Modulation Type

Displays selected Modulation Type. Selections include OFF, AM, FM and PM.

Soft Function Keys available with this field include:

F1 OFF
Turns Modulation Source (35) OFF.

F2 AM
Selects AM as Modulation Type for Modulation Source (35).

F3 FM
Selects FM as Modulation Type for Modulation Source (35).

F4 PM
Selects PM as Modulation Type for Modulation Source (35).

37. Deviation/Modulation Level

Displays selected Deviation in kHz if current Modulation Type (36) is FM with range from 0.0 to 100 kHz. Displays selected Percent Modulation if current Modulation Type (36) is AM with range from 0% to 100%. Displays selected Deviation in radians if current Modulation Type (36) is PM with range from 0 to 10 Radians. Field is not displayed if Modulation Type (36) is OFF.

38. Code

Displays selected code for DTMF Modulation Source. Soft Function Keys available with this field include:

F1 CLEAR
Clears code field of current data.

F2 CONT
Activates selected DTMF Code in repeating loop.

F3 BURST
Activates selected DTMF Code for one tone sequence.

F4 KEY
Configures DATA ENTRY Keys as DTMF keypad. Code Field displays press key and DTMF Generator produces specified DTMF Code.

39. Mark Time

Displays selected Mark Time for DTMF tones.

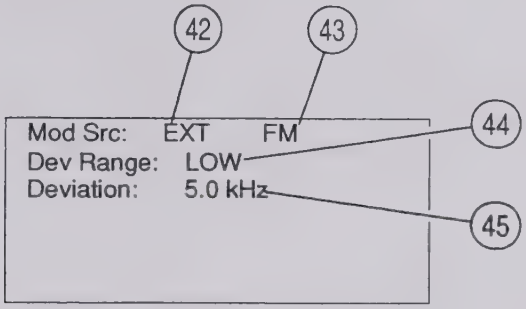
40. Space Time

Displays selected Space Time between DTMF tones.

41. Pause Time

Displays selected Pause Time between DTMF tone sequences for continuous transmissionc.

With EXT selected as Modulation Source, the Modulation Source Block is defined as follows:



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ITEM	DESCRIPTION

42. Modulation Source

Displays selected Modulation Source. Selections include GEN1 (Audio Generator 1), GEN2 (Audio Generator 2), DTMF (DTMF Tone Generator), DATA (DATA Generator), EXT (External Modulation) and MIC (Microphone Modulation).

Soft Function Keys available with this field include:

F1 GEN1
Accesses Audio Generator 1 parameters.

F2 GEN2
Accesses Audio Generator 2 parameters.

F3 DATA
Accesses DATA Generator parameters.

F4 DTMF
Accesses DTMF Generator parameters.

F5 EXT
Accesses External Modulation parameters.

F6 MIC
Accesses MIC Modulation parameters.

43. Modulation Type

Displays selected Modulation Type. Selections include OFF, AM, FM and PM.

Soft Function Keys available with this field include:

F1 OFF
Turns Modulation Source (42) OFF.

F2 AM
Selects AM as Modulation Type for Modulation Source (42).

F3 FM
Selects FM as Modulation Type for Modulation Source (42).

F4 PM
Selects PM as Modulation Type for Modulation Source (42).

44. Deviation Range

Displays selected Deviation Range for External FM Modulation. Field is not displayed for other Modulation Types (43). Selections include LOW and HIGH. LOW is used for deviation <20 kHz with a transfer of 2 kHz/V_{pk}. WIDE is used for deviation ≥20 to 100 kHz with a transfer of 10 kHz/V_{pk}.

F1 LOW
Selects LOW for Deviation Range.

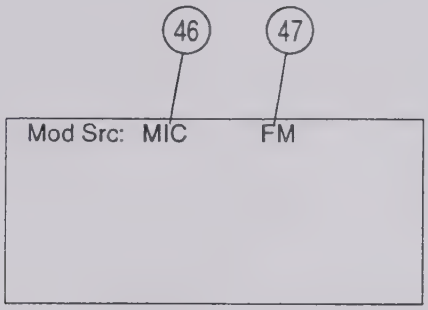
F2 HIGH
Selects HIGH for Deviation Range.

45. Deviation/Modulation Level

Displays External Deviation in kHz if current Modulation Type (43) is FM with range from 0.0 to 100 kHz. Displays Percent Modulation if current Modulation Type (43) is AM with range from 0% to 100%. Displays Deviation in radians if current Modulation Type (43) is PM with range from 0 to 10 Radians. Field is not displayed if Modulation Type (43) is OFF.

NOTE: Displayed Deviation/Modulation Level is valid only with sine wave input.

With MIC selected as Modulation Source, the Modulation Source Block is defined as follows:



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ITEM	DESCRIPTION

46. Modulation Source

Displays selected Modulation Source. Selections include GEN1 (Audio Generator 1), GEN2 (Audio Generator 2), DTMF (DTMF Tone Generator), DATA (DATA Generator), EXT (External Modulation) and MIC (Microphone Modulation).

Soft Function Keys available with this field include:

F1 GEN1
Accesses Audio Generator 1 parameters.

F2 GEN2
Accesses Audio Generator 2 parameters.

F3 DATA
Accesses DATA Generator parameters.

F4 DTMF
Accesses DTMF Generator parameters.

F5 EXT
Accesses External Modulation parameters.

F6 MIC
Accesses MIC Modulation parameters.

47. Modulation Type

Displays selected Modulation Type. Selections include OFF, AM, FM and PM.

Soft Function Keys available with this field include:

F1 OFF
Turns Modulation Source (47) OFF.

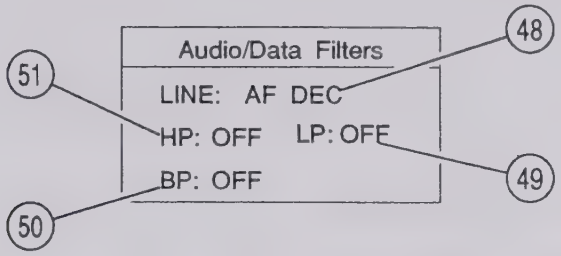
F2 AM
Selects AM as Modulation Type for Modulation Source (47).

F3 FM
Selects FM as Modulation Type for Modulation Source (47).

F4 PM
Selects PM as Modulation Type for Modulation Source (47).

C. AUDIO/DATA FILTERS BLOCK

During RF Generator Operation the COM-120A allows the user to configure filtering for audio signals passed to the unit through the Audio/Data In Connector to the AF Decode Line and Data Decode Line (for digital data). Additionally the user is allowed to configure the Speaker/Headphones output. Configuration is set from the RF Generator Filters Setup Menu. Filters are not editable from the RF Generator Screen. The following information is displayed on the RF Generate Operation Screen:



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ITEM	DESCRIPTION

48. Filter Line

Displays selected filter line. Readings for High-Pass Filter (51), Low-Pass Filter (49) and Bandpass Filter (50) reflect settings for displayed Filter Line. Filter Lines available with RF Generate Operation Screen are AF Decode Line (AF DEC), Data Decode Line (DAT DEC) and Speaker/Headphones Line (SPKR).

Soft Function Keys available with this field include:

F1 AF DEC
Selects AF Decode Line as current Filter Line.

F2 SPKR
Selects Speaker/Headphones Line as current Filter Line.

F6 CONFIG
Accesses RF Generator Filters Setup Menu.

ITEM	DESCRIPTION

49. Low-Pass Filter (LPF)

Displays current Low-Pass Filter setting for selected filter line if active. Settings displayed include OFF, 300 Hz, 4 kHz and 20 kHz.

NOTE: High-Pass Filter/Low-Pass Filter combination and Bandpass Filter cannot be active operate simultaneously.

50. Bandpass Filter (BPF)

Displays current Bandpass Filter setting for selected filter line if active. Settings displayed include OFF and C-MSG.

NOTE: High-Pass Filter/Low-Pass Filter combination and Bandpass Filter cannot be active simultaneously.

51. High-Pass Filter (HPF)

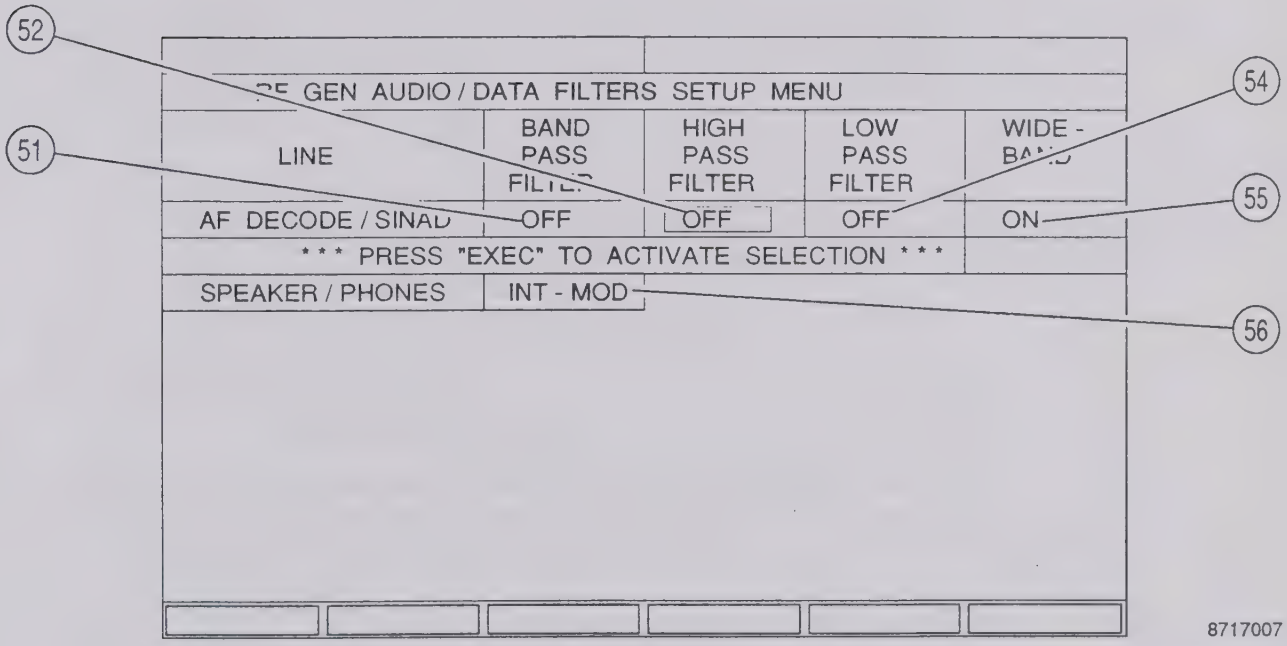
Displays current High-Pass Filter setting for selected filter line if active. Settings displayed include OFF, 300 Hz and 4 kHz.

NOTE: High-Pass Filter/Low-Pass Filter combination and Bandpass Filter cannot be active simultaneously.

Pressing CONFIG Soft Function Key F6 when the cursor is at Filter Line (48) accesses the RF Generator Filters Setup Menu. The RF Generator Filters Setup Menu is set up in a matrix format. Each row is a separate audio line. Each column is a separate filter line. The audio lines are the AF DECODE/SINAD Line and the DATA DECODER Line. The Speaker/Headphones has is on a separate row for editing filtering parameters. Specific filter columns are Bandpass Filter, High-Pass Filter, Low-Pass Filter and Wide Band Filter. Filter parameters for all RF Generator Audio/Data Lines are editable as shown:

NOTE: High-Pass Filter/Low-Pass Filter combination and Bandpass Filter cannot be active simultaneously.

EXEC Soft Function Key F5 must be pressed after edits are made for edits to be valid when returning to any other operation mode.



ITEM	DESCRIPTION

52. AF DECODE/SINAD Bandpass Filter Field

Displays current setting for AF DECODE/SINAD Bandpass Filter. Settings available include OFF and C-MSG. Setting this field to anything other than OFF automatically sets AF DECODE/SINAD High-Pass Filter Field (53) and AF DECODE/SINAD Low-Pass Filter Field (54) to OFF.

Soft Function Keys available with this field include:

F1 OFF
Deactivates Bandpass Filtering on AF DECODE/SINAD Line.

F2 C-MSG
Routes AF DECODE/SINAD Signal through C-Message Weighted Bandpass Filter.

F5 EXEC
Executes all edits made on this screen. Edits made are not valid if EXEC Soft Function Key is not pressed before returning to any other operation mode.

F6 RETURN
Returns to RF Generate Operation Screen.

53. AF DECODE/SINAD High-Pass Filter Field

Displays current setting for AF DECODE/SINAD High-Pass Filter. Settings available include OFF, 300 Hz and 4 kHz. Setting this field to anything other than OFF automatically sets AF DECODE/SINAD Bandpass Filter Field (52) to OFF.

Soft Function Keys available with this field include:

F1 OFF
Deactivates Low-Pass Filtering on AF DECODE/SINAD Line.

F2 300 Hz
Routes AF DECODE/SINAD Signal through 300 Hz High-Pass Filter.

F3 4 kHz
Routes AF DECODE/SINAD Signal through 4 kHz High-Pass Filter.

F5 EXEC
Executes all edits made on this screen. Edits made are not valid if EXEC Soft Function Key is not pressed before returning to any other operation mode.

F6 RETURN
Returns to RF Generate Operation Screen.

54. AF DECODE/SINAD Low-Pass Filter Field

Displays current setting for AF DECODE/SINAD Low-Pass Filter. Settings available include OFF, 300 Hz and 4 kHz. Setting this field to anything other than OFF automatically sets AF DECODE/SINAD Bandpass Filter Field (52) to OFF.

Soft Function Keys available with this field include:

F1 OFF
Deactivates Bandpass Filtering on AF DECODE/SINAD Line.

F2 300 Hz
Routes AF DECODE/SINAD Signal through 300 Hz Low-Pass Filter.

F3 4 kHz
Routes AF DECODE/SINAD Signal through 4 kHz Low-Pass Filter.

F4 20 kHz
Routes AF DECODE/SINAD Signal through 4 kHz Low-Pass Filter.

F5 EXEC
Executes all edits made on this screen. Edits made are not valid if EXEC Soft Function Key is not pressed before returning to any other operation mode.

F6 RETURN
Returns to RF Generate Operation Screen.

55. AF DECODE/SINAD Wideband Filter Field

Displays ON if all other filtering is off for AF DECODE/SINAD signal. Displays OFF if any filter is used for AF DECODE/SINAD signal. This field is for display only.

56. Speaker/Headphones Filter Field

Displays current setting for Speaker/Headphones Filter. Settings available include OFF, C-MSG (C-Message Weighted Filter), W.B. (Wideband) and INT-MOD (Internal Modulation). The first three selections relate to the audio being sent to the AUDIO/DATA IN Connector. The last selection is the composite modulation signal being generated by the COM-120A.

Soft Function Keys available with this field include:

F1 OFF
Sets Speaker/Headphones operation to OFF.

F2 C-MSG
Routes Audio signal from AUDIO/DATA IN Connector through C-Message Weighted Bandpass Filter to Speaker and Heaphone Connector.

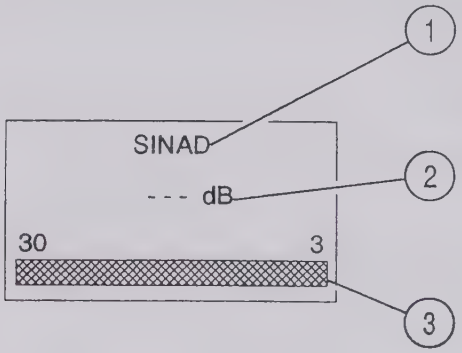
F3 W.B.
Routes Audio signal from AUDIO/DATA IN Connector to Speaker and PHONES Connector without filtering.

F4 INT-MOD
Routes Audio signal from internal Modulation sources as composite signal to Speaker and PHONES Connector.

D. SINAD METER

The SINAD Meter for the RF Generate measures SINAD for a 1 kHz tone passed through the AUDIO/DATA IN Connector. Filtering for the signal passed to the SINAD Meter is provided by the Audio/Data Filters. Refer to para 3-3-1(C) for information on filters.

Information provided from the RF Generate Operation Screen is displayed as follows:



8717040

ITEM	DESCRIPTION

1. SINAD/Distortion Meter Label

   Displays label for selected Meter Operation. Selections include SINAD and Distortion Meters. Refer to para 3-3-1(E) for description of Distortion Meter.

   Soft Function Keys available with this field include:

   F1 ZOOM
   Expands current meter into full-size meter.

   F2 SINAD
   Selects SINAD Meter as active meter. Not displayed if meter is currently active.

   F3 DIST
   Selects Distortion Meter as active meter. Not displayed if meter is currently active.

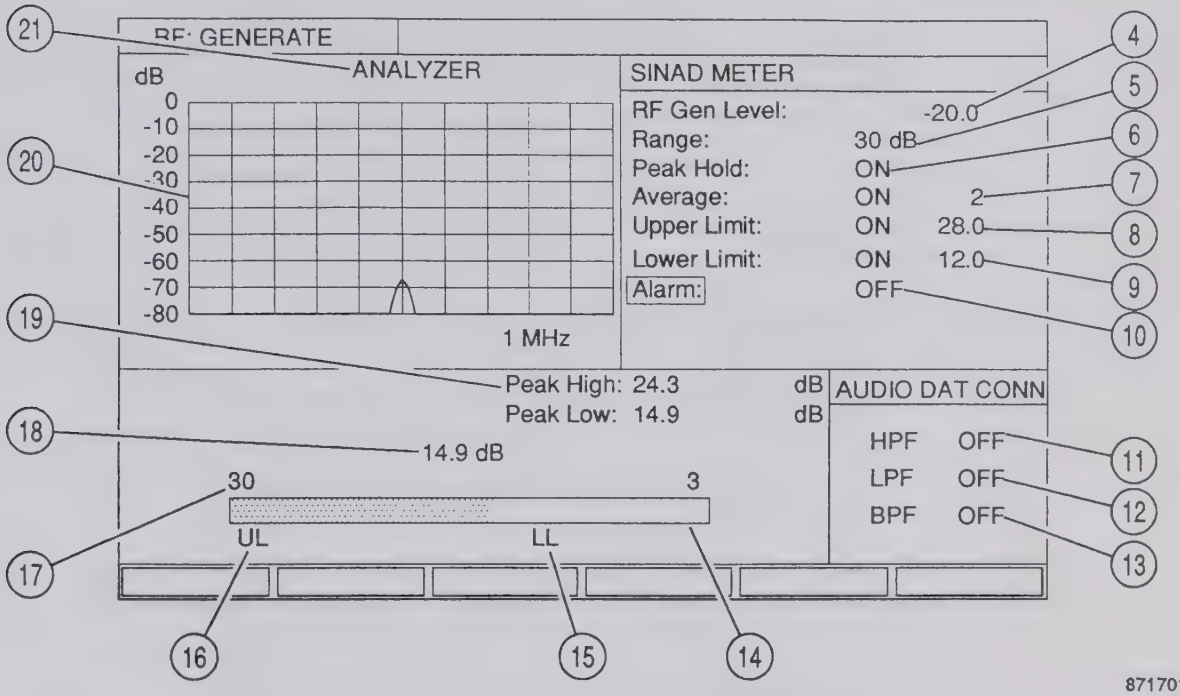
2. Meter Reading

   Displays current SINAD Meter Reading in dB.

3. Meter Bar

   Provides graphical display of current SINAD Meter reading in dB.

Pressing ZOOM Soft Function Key F1 when cursor is at SINAD/Distortion Meter Label (1) accesses full screen SINAD Meter. Available features and editable fields are listed as follows:



8717014

ITEM	DESCRIPTION

4. RF Gen Level

Displays Output Level in selected units. If T/R Connector is selected for Output (7) range is -130 to -20 dBm, .07 to 22360.6 µV, 0.0000 to 22.3606 mV and 0.000000 to 0.022360 V. If AUX RF Connector is selected for Output (7) range is -130 to -13 dBm, .07 to 50059.3 µV, 0.0000 to 50.0593 mV and 0.000000 to 0.050059 V.

Soft Function Keys available with this field include:

F1 dBm
Sets Output Level Units to dBm.

F2 uV
Sets Output Level Units to µV.

F3 mV
Sets Output Level Units to mV.

F4 V
Sets Output Level Units to V.

F5 SINAD=
Access field to set SINAD Search Function value.

F5 S=On/Off
Toggles SINAD Search Function On and Off. SINAD Seach Function changes Output Level to search for SINAD= value from UUT. S= Prompt is displayed with function ON.

5. Range

Displays selected SINAD Meter Upper Range. Selections include Autorange, 15 dB and 30 dB.

Soft Function Keys available with this function include:

F1 15 dB
Selects 15 dB as active upper range for SINAD Meter.

F2 30 dB
Selects 30 dB as active upper range for SINAD Meter.

F3 AUTO
Selects Autorange as active upper range for SINAD Meter. This setting automatically adjusts to a higher or lower upper range if signal increases or decreases to a specified level of the current setting.

F5 RST PK
Resets Peak Readings displayed to 0.

F6 RETURN
Returns Test Set to normal RF Generate Operation Screen.

6. Peak Hold

Displays current status of Peak Hold function. Displays OFF or ON. When ON, Peak Readings (19) are displayed.

Soft Function Keys available with this function include:

F1 OFF/ON
Toggles Peak Hold Function ON and OFF.

F5 RST PK
Resets Peak Hold Function.

F6 RETURN
Returns Test Set to Normal RF Generator Operation.

7. Average

Displays current status of Averaging Function and number of samples when active. Status is OFF or ON. Averaging Function averages selected number of readings and reports average as Digital Readout. Range is 2 to 10.

Soft Function Keys available with this function include:

F1 OFF/ON
Toggles Average Function ON and OFF.

F5 RST PK
Resets Peak Hold Function.

F6 RETURN
Returns Test Set to Normal RF Generator Operation.

8. Upper Limit

Displays current status of Upper Limit Function and Upper Limit value when active. Status is OFF or ON. Range is 0 to 30 dB. When ON, Upper Limit Bar (16) is displayed.

Soft Function Keys available with this function include:

F1 OFF/ON
Toggles Upper Limit Function ON and OFF.

F5 RST PK
Resets Peak Hold Function.

F6 RETURN
Returns Test Set to Normal RF Generator Operation.

9. Lower Limit

Displays current status of Lower Limit Function and Lower Limit value when active. Status is OFF or ON. Range is 0 to 30 dB. When ON, Lower Limit Bar (15) is displayed.

Soft Function Keys available with this function include:

F1 OFF/ON
Toggles Lower Limit Function ON and OFF.

F5 RST PK
Resets Peak Hold Function.

F6 RETURN
Returns Test Set to Normal RF Generator Operation.

10. Alarm

Displays current status of Alarm Function. Status is OFF or ON. When ON, Audible alarm sounds when signal exceeds Upper Limit (8) or is below Lower Limit (9).

Soft Function Keys available with this function include:

F1 OFF/ON
Toggles Alarm Function ON and OFF.

F5 RST PK
Resets Peak Hold Function.

F6 RETURN
Returns Test Set to Normal RF Generator Operation.

11. High-Pass Filter (HPF)

Displays current High-Pass Filter setting for SINAD Meter.

12. Low-Pass Filter (LPF)

Displays current Low-Pass Filter setting for SINAD Meter.

13. Bandpass Filter (BPF)

Displays current Bandpass Filter setting for SINAD Meter.

14. Bar Meter

Relative Graphic display of current SINAD Meter reading.

15. Lower Limit Bar

Indicates position of Lower Limit (9) on Bar Meter (14). If Lower Limit (9) exceeds Range (5), marker is not visible.

16. Upper Limit Bar

Indicates position of Upper Limit (8) on Bar Meter (14). If Upper Limit (8) exceeds Range (5), marker is not visible.

17. Upper Range Limit Readout

Displays current value of Range (4). Redefined as needed if Autorange function is active.

18. Digital Readout

Displays current SINAD Meter Reading.

19. Peak Readings

Displays current high and low Peak Readings when Peak Hold (6) is set to ON. Readings are reinitialized when RST PK Soft Function Key F5 is pressed.

ITEM	DESCRIPTION

20. SCOPE/ANALYZER Screen

    Displays digitized trace of specified signal as Oscilloscope or Spectrum Analyzer.

21. SCOPE/ANALYZER Prompt

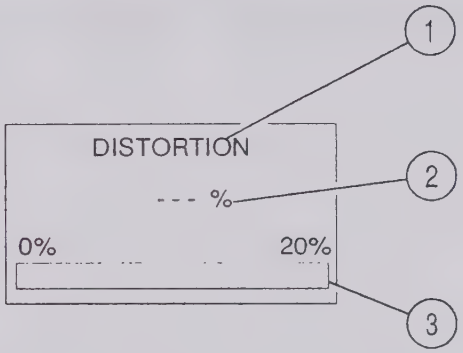
    Displays current operation function. Used to toggle between two functions. Refer to para 3-3-1(G) for information on RF Generator Oscilloscope Operation and para 3-3-1(H) for information on RF Generator Spectrum Analyzer Operation.

ITEM DESCRIPTION

E. DISTORTION METER

The Distortion Meter for the RF Generate measures Distortion for a 1 kHz tone passed through the AUDIO/DATA IN Connector. Filtering for the signal passed to the Distortion Meter is provided by the Audio/Data Filters. Refer to para 3-3-1(C) for information on filters.

Information provided from the RF Generate Operation Screen is displayed as follows:



8717044

ITEM DESCRIPTION

1. SINAD/Distortion Meter Label

   Displays label for selected Meter Operation. Selections include SINAD and Distortion Meters. Refer to para 3-3-1(D) for description of SINAD Meter.

   Soft Function Keys available with this field include:

   F1 ZOOM
   Expands current meter into full-size meter.

   F2 DIST
   Selects Distortion Meter as active meter. Not displayed if meter is currently active.

   F5 SINAD
   Selects SINAD Meter as active meter. Not displayed if meter is currently active.

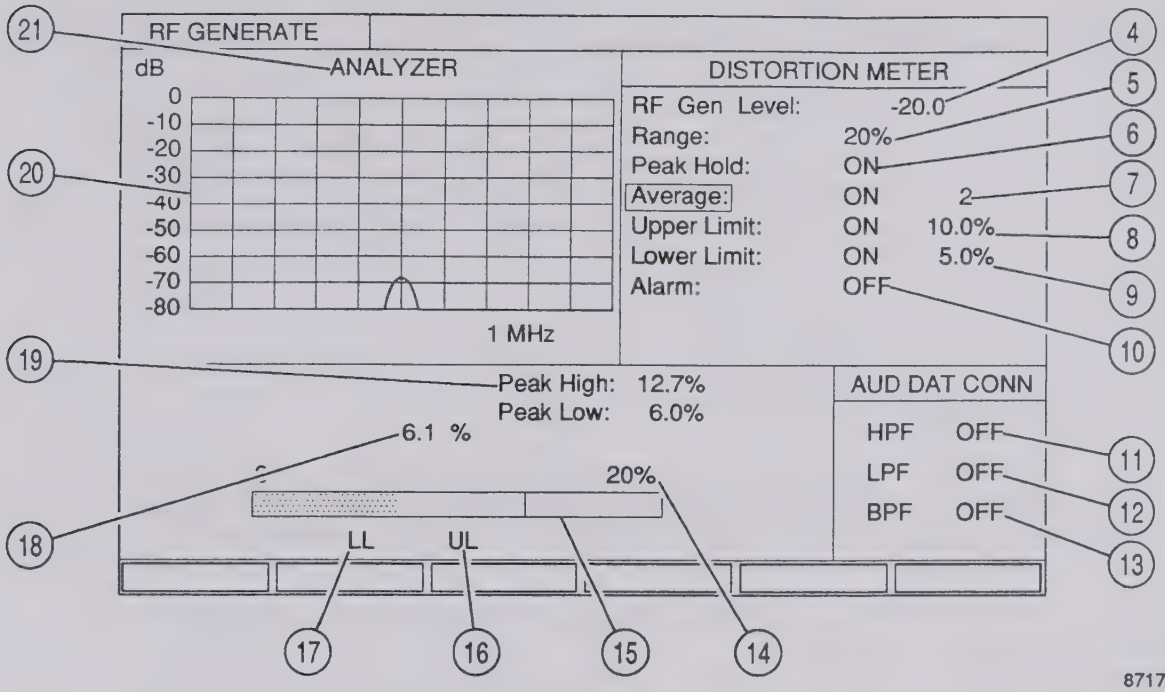
2. Meter Reading

   Displays current Distortion Meter Reading in % Distortion.

3. Meter Bar

   Provides graphical display of current Distortion Meter reading in % Distortion.

Pressing ZOOM Soft Function Key F1 when cursor is at SINAD/Distortion Meter Label (1) accesses full screen Distortion Meter. Available features editable fields are listed below:



8717062

ITEM	DESCRIPTION

4. RF Gen Level

Displays selected RF Level of RF Generator.

Soft Function Keys available with this function include:

F1 dBm
Sets Output Level Units to dBm.

F2 uV
Sets Output Level Units to µV.

F3 mV
Sets Output Level Units to mV.

F4 V
Sets Output Level Units to V.

5. Range

Displays Distortion Meter Upper Range of 20%. No other selections are available.

6. Peak Hold

Displays current status of Peak Hold function. Displays OFF or ON. When ON, Peak Readings (19) are displayed.

Soft Function Keys available with this function include:

F1 OFF/ON
Toggles Peak Hold Function ON and OFF.

F5 RST PK
Resets Peak Hold Function.

F6 RETURN
Returns Test Set to Normal RF Generator Operation.

7. Average

Displays current status of Averaging Function and number of samples when active. Status is OFF or ON. Averaging Funciton averages selected number of readings and reports the average as Digital Readout (18). Range is 2 to 10.

Soft Function Keys available with this function include:

F1 OFF/ON
Toggles Average Function ON and OFF.

F5 RST PK
Resets Peak Hold Function.

F6 RETURN
Returns Test Set to Normal RF Generator Operation.

8. Upper Limit

Displays current status of Upper Limit Function and Upper Limit value when active. Status is OFF or ON. Range is 0% to 20%. When ON, Upper Limit Bar (16) is displayed.

Soft Function Keys available with this function include:

F1 OFF/ON
Toggles Lower Limit Function ON and OFF.

F5 RST PK
Resets Peak Hold Function.

F6 RETURN
Returns Test Set to Normal RF Generator Operation.

ITEM	DESCRIPTION

9. Lower Limit

   Displays current status of Lower Limit Function and Lower Limit value when active. Status is OFF or ON. Range of value is 0% to 20%. When ON, Lower Limit Bar (17) is displayed.

   Soft Function Keys available with this function include:

   F1 OFF/ON
   Toggles Lower Limit Function ON and OFF.

   F5 RST PK
   Resets Peak Hold Function.

   F6 RETURN
   Returns Test Set to Normal RF Generator Operation.

10. Alarm

    Displays current status of Alarm Function. Status is OFF or ON. When ON, Audible alarm sounds when signal exceeds Upper Limit (8) or is below Lower Limit (9).

    Soft Function Keys available with this function include:

    F1 OFF/ON
    Toggles Alarm Function ON and OFF.

    F5 RST PK
    Resets Peak Hold Function.

    F6 RETURN
    Returns Test Set to Normal RF Generator Operation.

11. High-Pass Filter (HPF)

    Displays current High-Pass Filter setting for SINAD Meter.

12. Low-Pass Filter (LPF)

    Displays current Low-Pass Filter setting for SINAD Meter.

13. Bandpass Filter (BPF)

    Displays current Bandpass Filter setting for SINAD Meter.

14. Upper Range Limit Readout

    Displays current value of Range (5). Redefined as needed if Autorange function is active.

ITEM	DESCRIPTION

15. Bar Meter

    Relative Graphic display of current SINAD Meter reading.

16. Upper Limit Bar

    Indicates position of Upper Limit (8) on Bar Meter (14). If Upper Limit (8) exceeds Range (5), marker is not visible.

17. Lower Limit Bar

    Indicates position of LOWER LIMIT (9) on Bar Meter (14). If Lower Limit (9) exceeds Range (5), marker is not visible.

18. Digital Readout

    Displays current Distortion Meter Reading.

19. Peak Readings

    Displays current high and low Peak readings when Peak Hold (6) is set to ON. Readings are reinitialized when RST PK Soft Function Key F5 is pressed.

20. SCOPE/ANALYZER Screen

    Displays digitized trace of specified signal as Oscilloscope or Spectrum Analyzer.

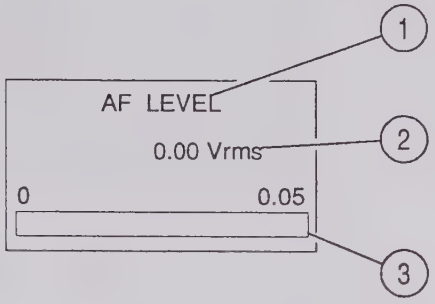
21. SCOPE/ANALYZER Prompt

    Displays current operation function. Used to toggle between two functions. Refer to para 3-3-1(G) for information on RF Generator Oscilloscope Operation and para 3-3-1(H) for information on RF Generator Spectrum Analyzer Operation.

F. AUDIO FREQUENCY LEVEL (AF LVL) METER

The Audio Frequency Level Meter for the RF Generate measures the level of an audio signal passed to the COM-120A through the AUDIO/DATA IN Connector. Measurements made are in Vrms, dBm (referenced to Impedence [16]) or dB as selected by user.

Information provided from the RF Generate Operation Screen is displayed as follows:



8717042

ITEM	DESCRIPTION

1. AF LVL Meter Label

   Label for Audio Frequency Level Meter Operation.

   Soft Function Keys available with this field include:

   F1 ZOOM
   Expands current meter into full-size meter.

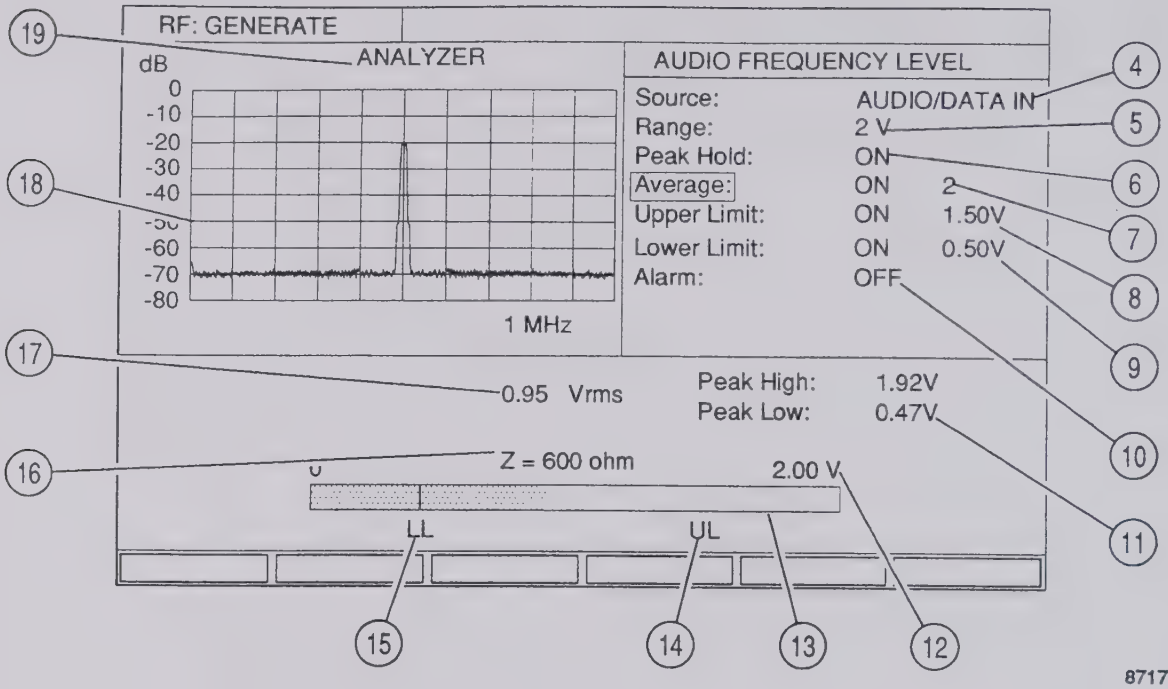
2. Meter Reading

   Displays current AF LVL Meter reading in Vrms, dBm (referenced to Impedance[16]) or dB as selected under Digital Readout (11).

3. Meter Bar

   Provides graphical display of current AF LVL Meter reading in Vrms.

Pressing ZOOM Soft Function Key F1 when cursor is at AF LVL Meter Label (1) accesses full screen Audio Frequency Level Meter. Available features and editable fields are as follows:



ITEM	DESCRIPTION

4. Source

Displays AUDIO/DATA IN Connector as source for Audio Frequency Level Meter. This field is for display only.

5. Range

Displays selected meter Range. Selections include AUTO (Autorange) and the following:

50 mVrms	100 mVrms	200 mVrms
500 mVrms	1 Vrms	2 Vrms
5 Vrms	10 Vrms	20 Vrms
50 Vrms		

Soft Function Keys available with this function include:

F1 MENU
Activates Menu for selecting Meter Range. Soft Function Keys available with this function include:

F6 RETURN
Returns Test Set to AF LVL Meter Operation Screen.

F6 RETURN
Returns Test Set to normal RF Generate Operation Screen.

6. Peak Hold

Displays current status of Peak Hold function. Displays OFF or ON. When ON, Peak Readings (11) are displayed.

Soft Function Keys available with this function include:

F1 OFF/ON
Toggles Peak Hold Function ON and OFF.

F5 RST PK
Resets Peak Hold Function.

F6 RETURN
Returns Test Set to Normal RF Generate Operation Screen.

7. Average

Displays current status of Averaging Function and number of samples when active. Status is OFF or ON. Averaging Function averages selected number of readings and reports average as Digital Readout (17). Range is 2 to 10.

Soft Function Keys available with this function include:

F1 OFF/ON
Toggles Average Function ON and OFF.

F5 RST PK
Resets Peak Hold Function.

F6 RETURN
Returns Test Set to Normal RF Generate Operation Screen.

8. Upper Limit

Displays current status of Upper Limit Function and Upper Limit value when active. Status is OFF or ON. Range is 0 to 50 Vrms. When ON, Upper Limit Bar (14) is displayed.

Soft Function Keys available with this function include:

F1 OFF/ON
Toggles Upper Limit Function ON and OFF.

F5 RST PK
Resets Peak Hold Function.

F6 RETURN
Returns Test Set to Normal RF Generator Operation.

9. Lower Limit

Displays current status of Lower Limit Function and Lower Limit value when active. Status is OFF or ON. Range is 0 to 50 Vrms. When ON, Lower Limit Bar (15) is displayed.

Soft Function Keys available with this function include:

F1 OFF/ON
Toggles Lower Limit Function ON and OFF.

F5 RST PK
Resets Peak Hold Function.

F6 RETURN
Returns Test Set to Normal RF Generator Operation.

10. Alarm

Displays current status of Alarm Function. Status is OFF or ON. When ON, Audible alarm sounds when signal exceeds Upper Limit (8) or is below Lower Limit (9).

Soft Function Keys available with this function include:

F1 OFF/ON
Toggles Alarm Function ON and OFF.

F5 RST PK
Resets Peak Hold Function.

F6 RETURN
Returns Test Set to Normal RF Generator Operation.

11. Digital Readout

Displays current AF LVL Meter Reading in selected units. Units available include Vrms, dBm (referenced to Impedance [16]) and dB.

Soft Function Keys available with this field include:

F1 Vrms
Selects Vrms as active units for measure.

F2 dBm
Selects dBm (referenced to Impedance [16]) as active units for measure.

F3 dB
Selects dB as active units for measure.

F6 RETURN
Returns Test Set to Normal RF Generator Operation.

ITEM	DESCRIPTION

12. Upper Range Limit Readout

    Displays current value of RANGE (5). Redefined as needed if Autorange function is active.

13. Bar Meter

    Relative Graphic display of current AF LVL Meter reading.

14. Lower Limit Bar

    Indicates position of Lower Limit (9) on Bar Meter (13). If Lower Limit (9) exceeds RANGE (5), marker is not visible.

15. Upper Limit Bar

    Indicates position of Upper Limit (8) on Bar Meter (13). If Upper Limit (8) exceeds RANGE (5), marker is not visible.

16. Impedance

    Reference Impedance for Digital Readout (11) in dBm.

17. Peak Readings

    Displays current high and low Peak readings when PEAK HOLD (6) is set to ON. Readings are reinitialized when RST PK Soft Function Key is pressed.

18. SCOPE/ANALYZER Screen

    Displays digitized trace of specified signal as Oscilloscope or Spectrum Analyzer.

19. SCOPE/ANALYZER Prompt

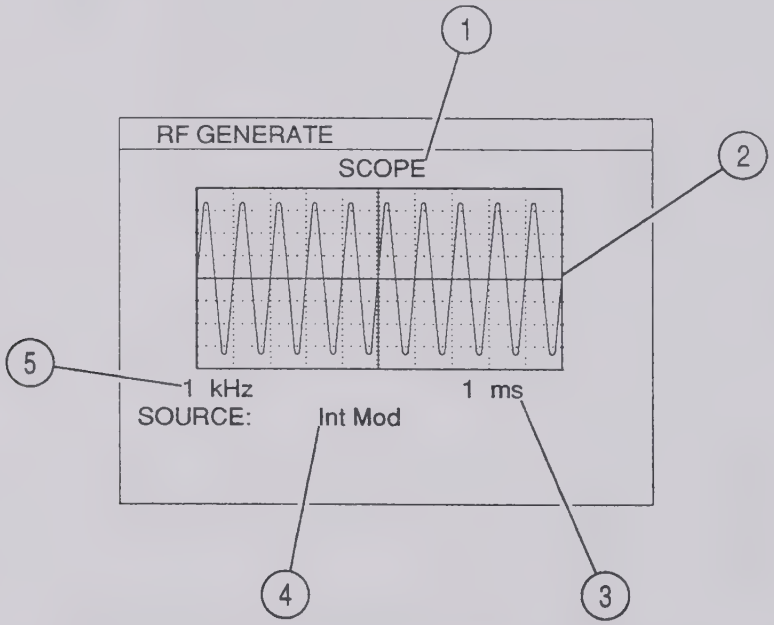
    Displays current operation function. Used to toggle between two functions. Refer to para 3-3-3(G) for information on RF Generator Oscilloscope Operation and para 3-3-1(H) for information on RF Generator Spectrum Analyzer Operation.

G. OSCILLOSCOPE OPERATION SCREEN

The abbreviated Oscilloscope, as follows below, is visible from the RF Generate Operation Screen and the following operation screens:

SINAD Meter Operation Screen (para 3-3-1[D])
Distortion Meter Operation Screen (para 3-3-1[E])
Audio Frequency Level Meter Operation Screen (para 3-3-1[F]).

Parameters set on any Operation Screen are reflected in all.



ITEM	DESCRIPTION

1. SCOPE/ANALYZER Prompt

   Displays current operation function. Used to toggle between two functions.

   Soft Function Keys are available on RF Generate Operation Screen only:

   F1 ZOOM
   Accesses expanded version of active function.

   F2 ANALY/SCOPE
   Accesses inactive function. If SCOPE is active, displays ANALY. If ANALYZER is active, displays SCOPE.

2. Oscilloscope Screen

   Displays digitized trace of specified signal.

3. Sweep

Displays selected Oscilloscope Sweep. Selections include:

100 µs/Div	200 µs/Div	500 µs/Div
1 ms/Div	2 ms/Div	5 ms/Div
10 ms/Div	20 ms/Div	50 ms/Div
100 ms/Div		

Soft Function Keys available with this function include:

F1 MENU
Accesses Menu to set Oscilloscope Scale. Soft Function Keys available with this function include:

F6 RETURN
Exits Menu into normal operation.

4. SCOPE SOURCE

Displays selected Oscilloscope Source. Selections include:

Source	Signal Input	Signal Type
Scope/DVM-GND	SCOPE/DVM Connector	External Ground-Coupled Signal
Scope/DVM-AC	SCOPE/DVM Connector	External AC-Coupled Signal
Scope/DVM-DC	SCOPE/DVM Connector	External DC-Coupled Signal
Ext Mod	EXT MOD IN Connector	External Modulation
Notch Residual	Internal Filtered Signal	Notch Filtered Signal passed to SINAD and Distortion Meters. Reading is relative with no units applied.
Audio/Data In	AUDIO/DATA IN Connector	External Audio or Data Signal
Int Mod	Internal Modulation	Composite Modulation Signal generated by Internal Audio/Data Generators

Soft Function Keys available with this field include:

F1 MENU
Accesses MENU to set active Oscilloscope Source. Soft Function Keys available with this function include:

F6 RETURN
Exits Menu into normal operation without changing Source.

5. Oscilloscope Scale

Displays selected Oscilloscope Vertical Scale. Selections available differ with different SCOPE SOURCE (4). Scales for each SCOPE SOURCE (4) are as follows:

SCOPE SOURCE (4)	Available Scales
Scope/DVM-GND	10, 20, 50, 100, 200, 500 mV/Div 1, 2, 5, 10, 20, 50 V/Div
Scope/DVM-AC	10, 20, 50, 100, 200, 500 mV/Div 1, 2, 5, 10, 20, 50 V/Div
Scope/DVM-DC	10, 20, 50, 100, 200, 500 mV 1, 2, 5, 10, 20, 50 V
Ext Mod	100, 200, 500 mV/Div 1, 2, 5 V/Div
Notch Residual	0.02, 0.04, 0.10, 0.20, 0.40, 1.00
Audio/Data In	100, 200, 500 mV/Div 1, 2, 5 V/Div
Int Mod	1, 2, 5, 10, 20, 50 kHz/Div

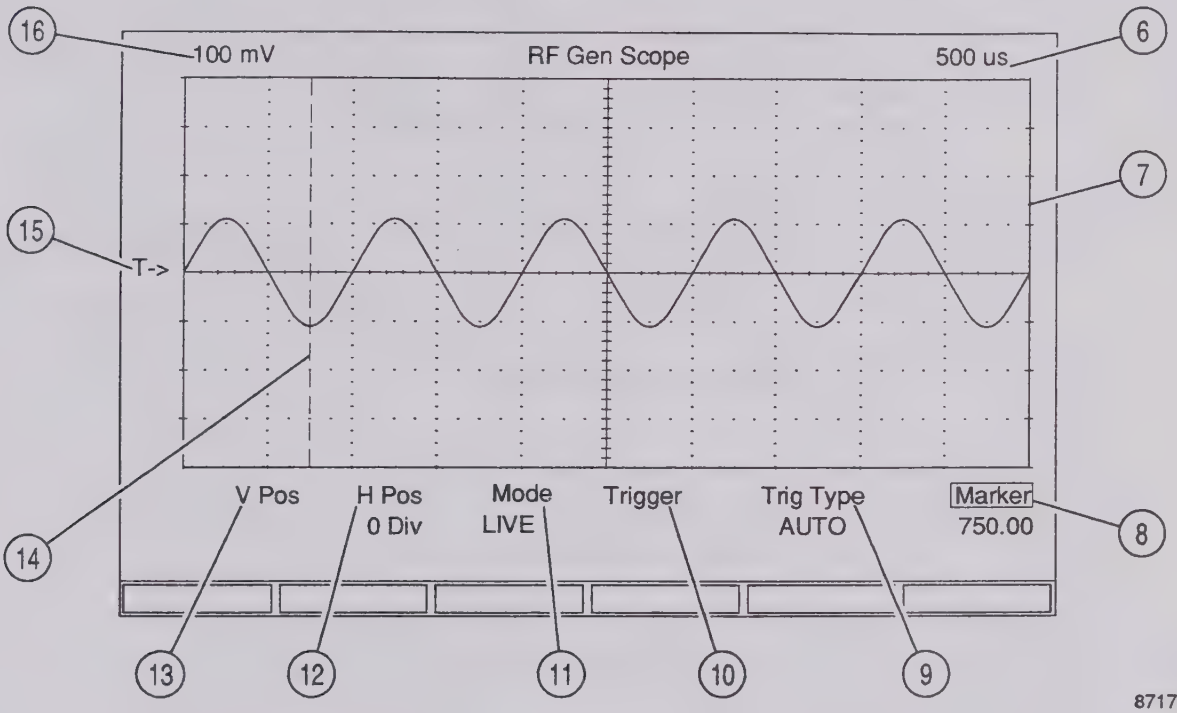
Soft Function Keys available with this field include:

F1 MENU
Accesses Menu to set Oscilloscope Scale. Soft Function Keys available with this function include:

F6 RETURN
Exits Menu into normal operation.

ITEM DESCRIPTION

Pressing ZOOM Soft Function Key F1 accesses full screen Oscilloscope, when cursor is on SCOPE/ANALYZER Prompt (1) of RF Generate Operation Screen and abbreviated Oscilloscope is displayed. Available features and parameters are as follows:



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ITEM DESCRIPTION

6. Sweep

Displays selected Oscilloscope Sweep. Selections include:

100 µs/Div	200 µs/Div	500 µs/Div
1 ms/Div	2 ms/Div	5 ms/Div
10 ms/Div	20 ms/Div	50 ms/Div
100 ms/Div		

Soft Function Keys available with this function include:

F1 MENU
Accesses Menu to set Oscilloscope Scale. Soft Function Keys available with this function include:

F6 RETURN
Exits Menu into normal operation.

7. Oscilloscope Screen

Displays digitized trace of specified signal.

8. Marker Position

Displays current Marker Position if Marker (14) is active or OFF if inactive. Value for Marker Position is in same units as Sweep (6) with Trigger point as reference.

Soft Function Keys available with this function include:

F1 ON/OFF
Toggles Marker (14) between ON and OFF.

9. Trigger Type

Displays current Trigger Type. Selections include Auto, One Shot and Normalized.

Soft Function Keys available with this function include:

F1 NORM
Selects Normalized Trigger Type.

F2 AUTO
Selects Auto as Trigger Type.

F3 1 SHOT
Selects and enables One Shot as Trigger Type.

10. Trigger

Adjusts trigger level as indicated by Trigger Level Indicator (15) when accessed.

11. Mode

Displays selected Operation Mode. Selections include Live, Compare, Recall, Store, and Average. Live displays current signal without modification. Compare displays Stored trace and live trace simultaneously. Recall displays Stored trace only. Store places copy of current trace in memory. Average displays average of last four traces.

Soft Function Keys available with this field include:

F2 LIVE
Selects LIVE as Oscilloscope Operation Mode.

F3 AVG
Selects Average as Oscilloscope Operation Mode.

F4 COMPARE
Selects COMPARE as Oscilloscope Operation Mode.

F5 RECALL
Selects RECALL as Oscilloscope Operation Mode.

F6 STORE
Selects STORE as Oscilloscope Operation Mode.

12. H Pos

Displays selected horizontal offset in major divisions. Selections range from -10 to +10 Divisions.

13. V Pos

Accesses vertical position of trace.

14. Marker

User editable Marker controlled using Marker Position (8). Movable through extent of visible screen.

15. Trigger Level Indicator

Indicates level of Oscilloscope Trigger Level. Editable using Trigger (10).

16. Oscilloscope Scale

Displays selected Oscilloscope Vertical Scale. Selections available differ with different Source as set in RF Generate Operation Screen. Scales are as follows:

SCOPE SOURCE (4)	Available Scales
Scope/DVM-GND	10, 20, 50, 100, 200, 500 mV/Div 1, 2, 5, 10, 20, 50 V/Div
Scope/DVM-AC	10, 20, 50, 100, 200, 500 mV/Div 1, 2, 5, 10, 20, 50 V/Div
Scope/DVM-DC	10, 20, 50, 100, 200, 500 mV 1, 2, 5, 10, 20, 50 V
Ext Mod	100, 200, 500 mV/Div 1, 2, 5 V/Div
Notch Residual	0.02, 0.04, 0.10, 0.20, 0.40, 1.00
Audio/Data In	100, 200, 500 mV/Div 1, 2, 5 V/Div
Int Mod	1, 2, 5, 10, 20, 50 kHz/Div

Soft Function Keys available with this field include:

F1 MENU
Accesses Menu to set Oscilloscope Scale. Soft Function Keys available with this function include:

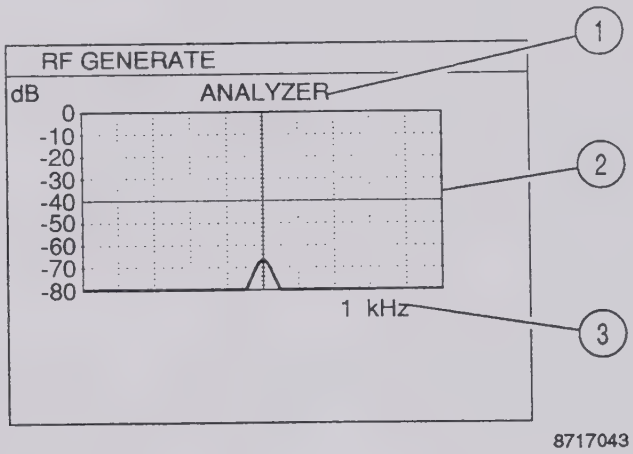
F6 RETURN
Exits Menu into normal operation.

H. SPECTRUM ANALYZER OPERATION SCREEN

The abbreviated Spectrum Analyzer, as follows, is visible from the RF Generate Operation Screen and the following Operation Screens:

SINAD Meter Operation Screen (para 3-3-1[D])
Distortion Meter Operation Screen (para 3-3-1[E])
Audio Frequency Level Meter Operation Screen (para 3-3-1[F])

Parameters set on any Operation Screen are reflected in all.



ITEM	DESCRIPTION

1. SCOPE/ANALYZER Prompt

   Displays current operation function. Used to toggle between two functions.

   Soft Function Keys available on RF Generate Operation Screen include:

   F1 ZOOM
   Accesses expanded version of active function.

   F2 ANALY/SCOPE
   Accesses inactive function. If SCOPE is active, displays ANALY. If ANALYZER is active, displays SCOPE.

2. Spectrum Analyzer Screen

   Displays digitized trace of specified signal.

ITEM	DESCRIPTION

3. Scan Width

Displays selected Scan Width per division. Selections include zero scan and:

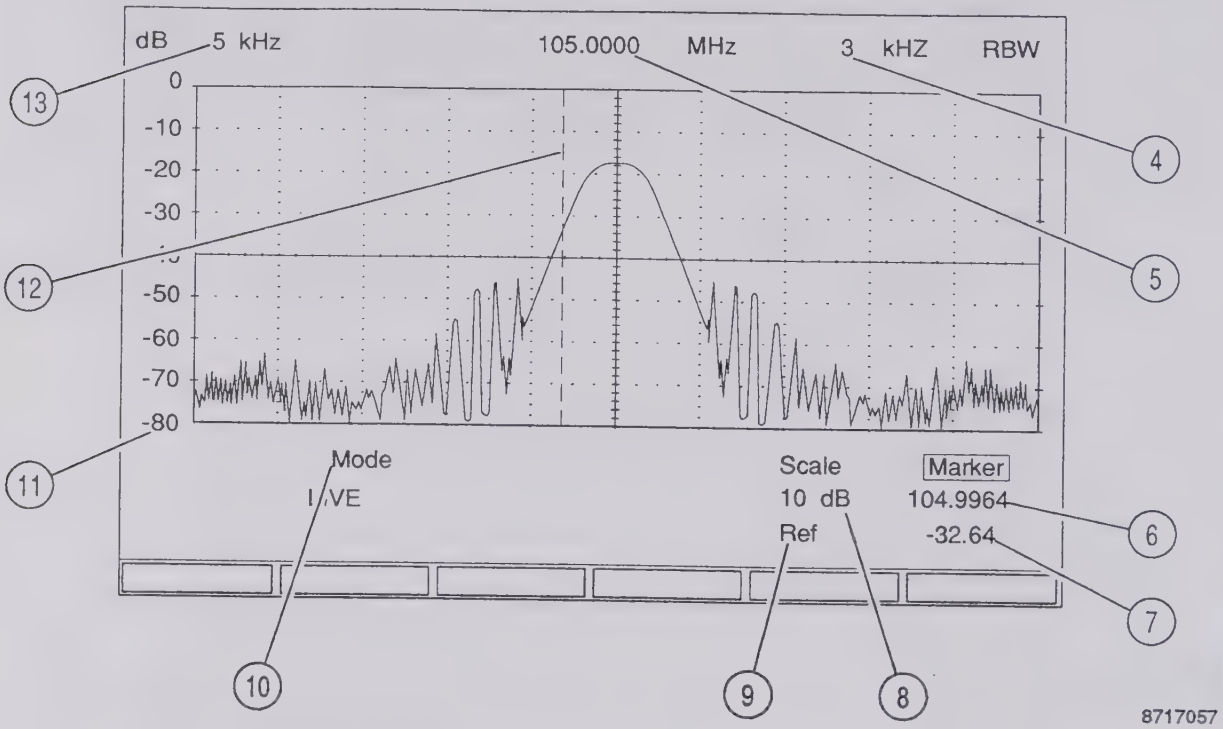
1 kHz/Div	2 kHz/Div	5 kHz/Div
10 kHz/Div	20 kHz/Div	50 kHz/Div
100 kHz/Div	200 kHz/Div	500 kHz/Div
1 MHz/Div		

Soft Function Keys available with this function include:

F1 MENU
Accesses Menu to set Scan Width. Soft Function Keys available with this function include:

F6 RETURN
Exits Menu into normal operation.

Pressing ZOOM Soft Function Key F1 accesses full screen Spectrum Analyzer, when cursor is on SCOPE/ANALYZER Prompt (1) of RF Generate Operation Screen and abbreviated Spectrum Analyzer is displayed. Available features and parameters are as follows:



ITEM	DESCRIPTION

4. Resolution Bandwidth

   Displays Resolution Bandwidth for selected Scan Width (13). This field is for display only.

5. Center Frequency

   Displays current selected Center Frequency. Selections range from 0.2500 to 1000.0000 MHz.

   F1 Set Ref
   Adjusts Spectrum Analyzer to an internal reference level at current frequency. Function must be initiated at each new frequency to achieve maximum accuracy.

6. Marker Position

   Displays current Marker Position if Marker (12) is active or OFF if inactive. Value for Marker Position is in same units as Scan Width (13) with Center Frequency (5) as reference.

Soft Function Keys available with this function include:

F1 ON/OFF
Toggles Marker (12) between ON and OFF.

7. Marker Level

Displays current Marker Level if Marker (12) is active. Displays Blank if Marker (12) is OFF.

8. Scale

Displays selected Logarithmic Scale for Spectrum Analyzer Vertical Scale (11). Selections are 2 and 10 dB.

F1 10 dB
Selects 10 dB Logarithmic Scale for Spectrum Analyzer Vertical Scale (11).

F2 2 dB
Selects 2 dB Logarithmic Scale for Spectrum Analyzer Vertical Scale (11).

9. Reference

Adjusts Spectrum Analyzer Vertical Scale (11) ±10 dB when Scale (8) is set to 10 dB. When Scale (8) is set to 2 dB, adjusts Spectrum Analyzer Vertical Scale (11) through full range, displaying 16 dB window and incrementing in 1 dB steps.

10. Mode

Displays selected Operation Mode. Selections include Peak Hold, Live, Compare, Recall, Store, Average and Normalized.

Soft Function Keys available with this field include:

F1 PKHOLD
Selects PEAK HOLD as Spectrum Analyzer Operation Mode.

F2 LIVE
Selects LIVE as Spectrum Analyzer Operation Mode.

F3 AVG
Selects AVERAGE as Spectrum Analyzer Operation Mode.

F4 COMPARE
Selects COMPARE as Spectrum Analyzer Operation Mode.

F5 RECALL
Selects RECALL as Spectrum Analyzer Operation Mode.

F6 STORE
Selects STORE as Spectrum Analyzer Operation Mode.

ITEM DESCRIPTION

11. Vertical Scale

Provides logarithmic scale for Spectrum Analyzer. Position is controlled by Reference (9).

12. Marker

User editable Marker controlled using Marker Position (6).

13. Scan Width

Displays selected Scan Width per division. Selections include zero scan and:

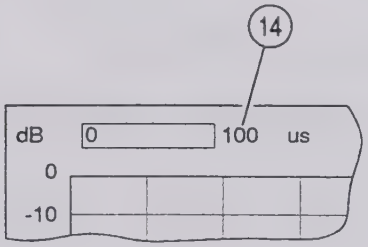
1 kHz/Div	2 kHz/Div	5 kHz/Div
10 kHz/Div	20 kHz/Div	50 kHz/Div
100 kHz/Div	200 kHz/Div	500 kHz/Div
1 MHz		

Soft Function Keys available with this function include:

F1 MENU
Accesses Menu to set Scan Width. Soft Function Keys available with this function include:

F6 RETURN
Exits Menu into normal operation.

When Scan Width (13) is set to Zero Scan, the following field becomes active:



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ITEM DESCRIPTION

14. Zero Scan Sweep

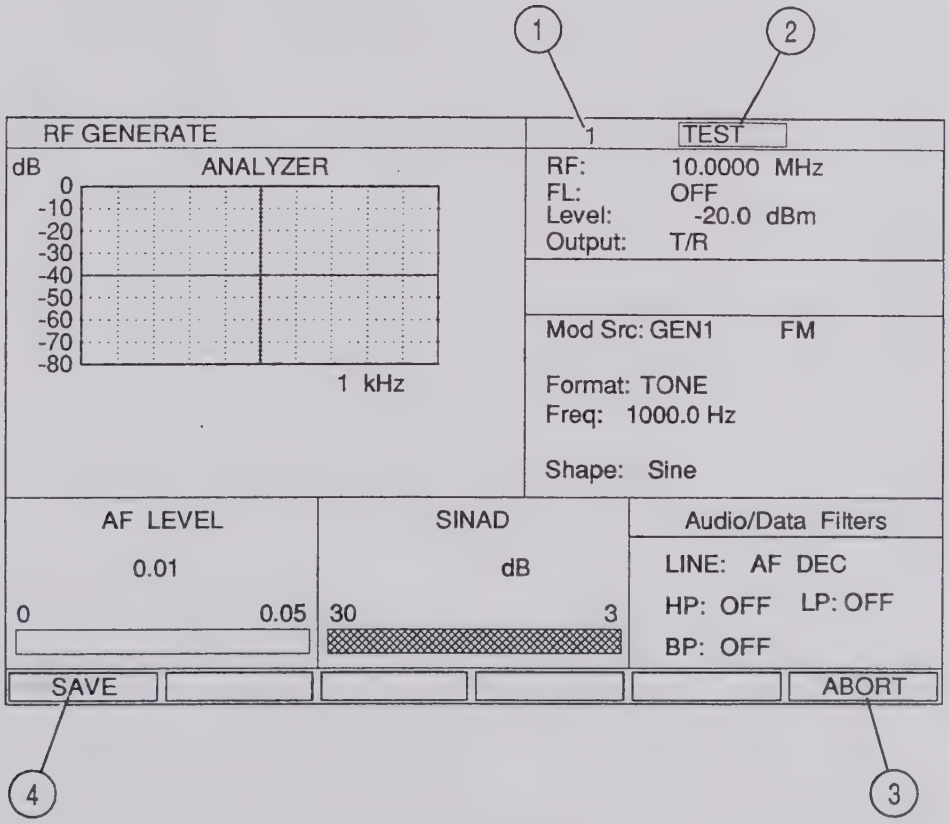
Displays selected Sweep per division when Scan Width (13) is set to Zero Scan. Selections include:

100 µs/Div	200 µs/Div	500 µs/Div
1 ms/Div	2 ms/Div	5 ms/Div
10 ms/Div	20 ms/Div	50 ms/Div
100 ms/Div		

I. STORE AND RECALL OPERATION

Pressing STORE Memory Key allows the operator to store up to 100 RF Generate Operation Screen configurations. Storage Locations 0 through 99 can be used to store a RF Generate Operation configuration, RF Receive Operation configuration or Duplex Operation configuration (Receive and Generate pair). Refer to 3-3-8(B) for information on the Setup List that displays all Memory Locations, operation types and associated Memory Location Label (2).

Pressing STORE Memory Key when in RF Generate Operation Screen accesses the following fields:



8717068

ITEM	DESCRIPTION

1. Memory Location

   Displays selected Memory Location for storage of current configuration. Refer to para 3-3-8(B) for information on the Setup List that displays all Memory Locations, operation types and associated Memory Location Label (2).

2. Memory Location Label

   Displays optional alphanumeric label for selected Memory Location.

ITEM	DESCRIPTION

3. ABORT Soft Function Key F6

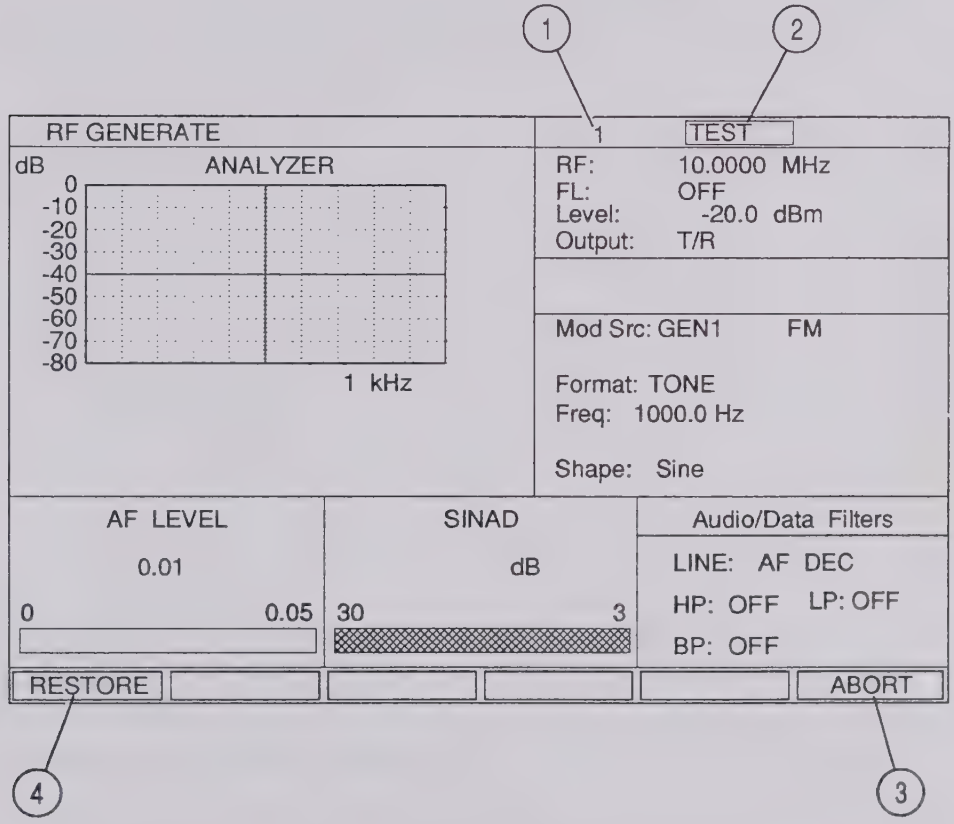
   Escapes Storage Operation without performing edit. SAVE Soft Function Key F1 (3) or ABORT Soft Function Key F6 must be pressed to return to normal operation.

4. SAVE Soft Function Key F1

   Finalizes Storage Operation. SAVE Soft Function Key F1 or ABORT Soft Function Key F6 (4) must be pressed to return to normal operation.

Pressing RCL Memory Key allows the operator to recall up to 100 previously stored operation screens. RF Receive, RF Generate or Duplex Operation Screen configurations can all be accessed from the RF Generate Operation Screen. Accessing anything other than an RF Generate Operation Screen configuration, automatically switches the COM-120A to the selected mode of operation. Refer to para 3-3-8(B) for information on the Setup List that displays all Memory Locations, operation types and associated Memory Location Label (2).

Pressing RCL Memory Key when in RF Generate Operation Screen accesses the following fields:



8717070

ITEM	DESCRIPTION

1. Memory Location

   Displays selected Memory Location for recall of stored configuration. Refer to 3-3-8(B) for information on the Setup List that displays all Memory Locations, operation types and associated Memory Location Label (2).

2. Memory Location Label

   Displays optional alphanumeric label for selected Memory Location.

ITEM	DESCRIPTION

4. ABORT Soft Function Key F6

   Escapes Storage Operation without performing edit. RESTORE Soft Function Key F1 (3) or ABORT Soft Function Key F6 must be pressed to return to normal operation.

3. RESTORE Soft Function Key F1

   Finalizes Recall Operation. RESTORE Soft Function Key F1 or ABORT Soft Function Key F6 (4) must be pressed to return to normal operation.

3-3-2 RF RECEIVE OPERATION SCREEN

The RF Receive Operation Screen is used to define and activate the COM-120A RF Receiver. The RF Receive Operation Screen is accessed by pressing the RCV Test Mode Key. Once activated, the COM-120A CRT Display shows a screen similar to Figure 3-4. When accessed, the RF Receive Operation Screen is set up in the configuration last used.

Because of the level of detail required to fully describe the RF Receive Operation Screen, information is split by function into sections. The first section covers the overall screen and refers the operator to other sections for additional information.

Section	Title	Page
A.	RF Receive General Operation Screen	3-66
B.	Audio/Data Filters Block	3-74
C.	Decoding Screens	3-84
D.	SINAD Meter	3-86
E.	Distortion Meter	3-91
F.	FM Deviation Meter	3-96
G.	AM Modulation Meter	3-102
H.	Phase Modulation Meter	3-108
I.	RF Power Meter	3-114
J.	Received Level Meter	3-119
K.	RF Frequency Error Meter	3-124
L.	Audio Frequency Counter	3-129
M.	Oscilloscope Operation Screen	3-133
N.	Spectrum Analyzer Operation Screen	3-141
O.	Store and Recall Operation	3-147

A. RF RECEIVE GENERAL OPERATION SCREEN

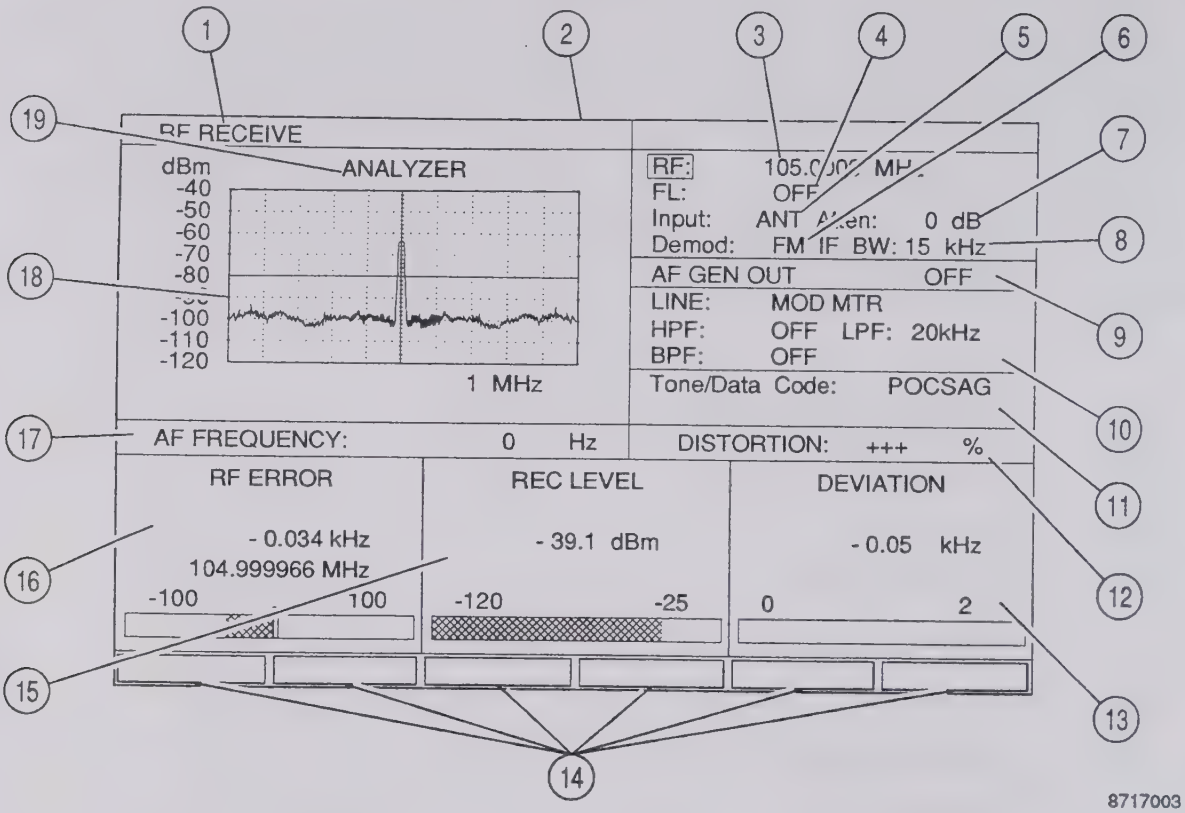


Figure 3-4 RF Receive Operation Screen

ITEM	DESCRIPTION

1. Header Bar

   Displays current operation mode.

2. MEMORY Prompt

   If Stored RF Receive Setup is recalled, displays recalled number (01-99) and Label if used. Blank if RF Receive Operation Screen is in active mode.

3. RF Field

   Displays current RF Receive Frequency from 0.2500 to 999.9999 MHz. Scan Function searches a specified Frequency List (4) range, stopping for a selected time period or when squelch is broken. Sweep Function sweeps a set range of frequencies, increasing or decreasing frequency at set rate and stopping for a set time or when squelch is broken. Δ Function allows change of frequency in selected increment (Δ).

Soft Function Keys available with this field include:

F1 Δ=
Accesses window to set RF Frequency Field change increment (Δ).

F2 Δ ON/OFF
Toggles Δ Function OFF and ON. If Δ Function is active, Δ Prompt is displayed.

F3 SCAN
Accesses Scan Menu for setting parameters of Scan Function. Scan Function scans specified frequencies on Frequency List. Additional variables include Pause Time and Delay Time. With Pause Time set to zero, Scan Function is dependent on squelch. When Squelch is broken, the Receiver stops scanning and remains on frequency until COM-120A is squelched for time period greater than Delay Time. RF Field and FL Field (4) reflect frequency where squelch is broken. With value other than zero in Pause Time field, RF Receiver delays at each frequency for time equal to Pause Time, with Delay Time not used. With Scan Function active, Soft Function Keys are defined as follows:

F1 START
Activates Scan Function in continuous loop.

F2 STOP
Stops active Scan Function.

F3 SINGLE
Activates Scan Function for one sequence.

F5 RESUME
Resumes Scan Function after STOP Soft Function Key F2 is pressed at next Frequency List setting.

F6 RETURN
Returns COM-120A to normal RF Receive Operation.

F4 SWEEP
Accesses menu to configure COM-120A RF Receiver to sweep a specified frequency range. Sweep Function scans specified frequency range. Additional variables include Pause Time and Delay Time. With Pause Time set to zero, Sweep Function is dependent on squelch. When Squelch is broken, Receiver stops sweeping and remains on that frequency until the COM-120A is squelched for a time period greater than the Delay Time. RF Field and FL Field (4) reflect the frequency where squelch is broken. With a value other than zero in Pause Time field, RF Receiver delays at each frequency for time equal to Pause Time, with Delay Time not used. With Sweep Function active, Soft Function Keys are defined as follows:

F1 START
Activates Sweep Function in continuous loop.

F2 STOP
Stops Sweep Function.

F3 SINGLE
Activates Sweep Function for one pass through frequency range.

F5 RESUME
Resumes Scan Function after STOP Soft Function Key F2 was pressed at next frequency.

F6 RETURN
Returns COM-120A to normal RF Receive Operation.

F5 LOCK/UNLOCK
Sets frequency used for Receive Operation and Spectrum Analyzer Operation to same frequency as current RF Field. If LOCK Function is active, "L" is displayed and UNLOCK is displayed for F5 definition. Pressing F5 when UNLOCK is displayed, toggles LOCK Function off.

4. FL (Frequency List) Setting

Displays selected Frequency List number (FL-00 through FL-99) when active and OFF when inactive. RF Field (3) echoes frequency of selected Frequency List setting. Directly editing RF Field (3) inactivates FL Setting. Displays optional Frequency List Label if used.

Soft Function Keys available with this field include:

F1 On/Off
Toggles active function ON and OFF.

F2 T-Fwd
Accesses Trunking-Forward Channel List.

F3 T-Rvs
Accesses Trunking-Reverse Channel List.

F4 C-Fwd
Accesses Cellular-Forward Channel List.

F5 C-Rvs
Accesses Cellular-Reverse Channel List.

F6 FL
Accesses User Defined Frequency List. Refer to para 3-3-8(A) for information on editing User Defined Frequency List.

5. Input Connector

Displays connector selected for input. Displays either T/R or ANT.

Soft Function Keys available with this field include:

F1 T/R
Selects T/R Connector as input connector.

F2 ANT
Selects ANTENNA Connector as input connector.

6 Demodulation Type

Displays selected Demodulation Type. Selections include FM, AM or PM.

Soft Function Keys available with this field include:

F1 FM
Selects FM Demodulation.

F2 AM
Selects AM Demodulation.

F3 PM
Selects PM Demodulation.

7. Attenuation

Displays selected attenuation of input signal. Displays either 0 or 30.

Soft Function Keys available with this field include:

F1 30 dB
Selects 30 dB Attenuation.

F2 0 dB
Selects 0 dB Attenuation.

8. IF Bandwidth

Displays selected IF Bandwidth. Selections include 15 and 300 kHz.

Soft Function Keys available with this field include:

F1 300 kHz
Selects 300 kHz bandpass filter as active filter.

F2 15 kHz
Selects 15 kHz bandpass filter as active filter.

9. AF GEN OUT Field

Pressing ENTER, when cursor is on this field, accesses setup menu for AF Generator sources. Menu displays each source individually. Refer to para 3-3-6 for more information on each source. Sources available include GEN1 (Audio Generator 1), GEN2 (Audio Generator 2), DTMF (DTMF Tone Generator) and DATA (DATA Generator).

Soft Function Keys available with this field include:

F1 ZOOM
Expands window to allow editing of Audio/Data Generators. Soft Function Keys available with this function are:

F1 GEN1
Accesses GEN1 Setup Menu.

F2 GEN2
Accesses GEN2 Setup Menu.

F3 DATA
Accesses DATA Setup Menu.

F4 DTMF
Accesses DTMF Setup Menu.

F6 RETURN
Returns unit to normal RF Receive Operation.

10. AUDIO/DATA FILTERS Block

Displays current filter information for selected analog signal. Selections include Modulation Meters Line, AF Decode Line, AF Counter Line, Data Decode Line and Speaker/Headphones Line. Refer to para 3-3-2(B) for additional information on Audio/Data Filters.

11. Tone/Data Code Field

Displays selected Tone/Data Type and decoded data. Selections for Tone/Data Type available with standard COM-120A include:

DCS	DTMF	USER
DCS INV (DCS Inverted)		

Additional selections are shown, but are unusable unless Option 09 or Option 11 is installed. Refer to Section 6 for additional information on options. Additional selections available include:

CCIR	CCIRH	CCIRH4
EEA	EIA	NATEL
ZVEI	DZVEI	DDZVEI
EURO	5/6 TONE	POCSAG
POCSAG/ (POCSAG Inverted)		

Soft Function Keys available with this field include:

F1 MENU
Displays TONE/DATA Type selections.

F6 RETURN
Returns COM-120A to normal RF Receive Operation.

F2 DECODE
Activates DECODE Function for specified Audio/Data type. Accesses Tone Decode Screen for USER Defined signalling format and initiates decoding function for DCS and DCS Inverted Functions. Refer to para 3-3-2(C) for further information on decode screens.

Soft Function Keys available with USER selected for TONE/DATA Type include:

F3 CONFIG
Accesses Configuration Window for configuring User Selectable Frequency and Duration for codes 0 through 9 and A through T. With Configuration Window active, Soft Function Keys are defined as follows:

F1 PG UP
Used to scroll up through Configuration Window.

F2 PG DN
Used to scroll down through Configuration Window.

F3 FILL
Fills remainder of column with value of current cursor position.

F6 RETURN
Exits Configuration Window into normal RF Receive operation.

12. DISTORTION/SINAD/MODULATION Reading

Displays distortion reading of received signal if Distortion is selected. Displays SINAD reading of received signal if SINAD is selected. Displays modulation reading in units of selected DEMOD Type (6) if Modulation is selected. This field is interactive with DISTORTION/SINAD/MODULATION Meter (18). This field displays reading only when DISTORTION/SINAD/MODULATION Meter (18) displays meter. The same reading cannot be displayed twice. Selection of a specific reading will change source of nonedited field to other source. One source must always be Modulation. Refer to para 3-3-2(D) for information on the RF Receive SINAD Meter, para 3-3-2(E) for information on the Distortion Meter, para 3-3-2(F) for information on the FM Deviation Meter, para 3-3-2(G) for information on the AM Modulation Meter and para 3-3-2(H) for information on the Phase Modulation Meter.

Soft Function Keys available with this field include:

F1 ZOOM
Selects Meter Operation Screen of currently active meter.

F2 SINAD
Selects SINAD reading as active. Blank if SINAD currently active.

F3 DIST
Selects Distortion reading as active. Blank if DIST currently active.

F4 DEV
Selects Modulation reading as active. Blank if DEV currently active. Modulation reading unit type is dependent on Demodulation Type (6).

13. DISTORTION/SINAD/MODULATION Meter

Displays distortion reading of received signal if Distortion is selected. Displays SINAD reading of received signal if SINAD is selected. Displays modulation reading in units of selected DEMOD Type (6) if Modulation is selected. This field is interactive with DISTORTION/SINAD/MODULATION Reading (17). This field displays complete meter when DISTORTION/SINAD/MODULATION Reading (17) displays reading only. The same reading cannot be displayed twice. Selection of a specific reading will change source of nonedited field to other source. One source must always be Modulation. Refer to para 3-3-2(D) for information on the RF Receive SINAD Meter, para 3-3-2(E) for information on the Distortion Meter, para 3-3-2(F) for information on the FM Deviation Meter, para 3-3-2(G) for information on the AM Modulation Meter and para 3-3-2(H) for information on the Phase Modulation Meter.

Soft Function Keys available with this field include:

F1 ZOOM
Selects Meter Operation Screen of currently active meter.

F2 SINAD
Selects SINAD Meter as active meter. Blank if SINAD currently active.

F3 DIST
Selects Distortion Meter as active meter. Blank if DIST currently active.

F4 DEV
Selects Modulation Meter as active meter. Blank if DEV currently active. Modulation reading unit type is tied to Demodulation Type (6).

14. Soft Function Key Definitions

Functions are redefined with each field of the current operation screen.

15. Power/Received Level Meter

Power Meter displays power level of signal received through T/R Connector only in dB and Watts. RECEIVED LEVEL Meter displays referenced Power Level of signal received through ANTENNA Connector only in dBm and µV. Refer to para 3-3-2(I) for description of Power Meter and para 3-3-2(J) for description of Received Level Meter.

Soft Function Keys available with this field include:

F1 ZOOM
Selects Meter Operation Screen of currently active meter.

16. RF ERROR Meter

Displays difference in RF Field (3) and frequency of received signal. Refer to para 3-3-2(K) for description of RF ERROR Meter.

Soft Function Keys available with this field include:

F1 ZOOM
Selects Meter Operation Screen of RF ERROR Meter.

17. AF FREQUENCY Counter

Displays Audio Frequency of received signal. Refer to para 3-3-2(L) for description of AF FREQUENCY Counter.

Soft Function Keys available with this field include:

F1 ZOOM
Selects Meter Operation Screen of AF FREQUENCY Counter.

18. SCOPE/ANALYZER Screen

Displays digitized trace of specified signal as Oscilloscope or Spectrum Analyzer.

19. SCOPE/ANALYZER Prompt

Displays current operation function. Used to toggle between two functions. Refer to para 3-3-2(M) for information on RF Receiver Oscilloscope Operation and para 3-3-2(N) for information on RF Receiver Spectrum Analyzer Operation.

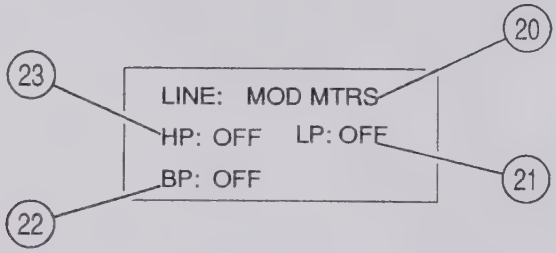
Soft Function Keys available with this field include:

F1 ZOOM
Accesses expanded version of active function.

F2 ANALY/SCOPE
Accesses inactive function. If SCOPE is active, displays ANALY. If ANALYZER is active, displays SCOPE.

B. AUDIO/DATA FILTERS BLOCK

During RF Receiver Operation the COM-120A allows the user to configure filtering for demodulated signals passed to the AF Frequency Counter and Modulation Meters, audio signals passed to the unit through the AUDIO/DATA IN Connector to the AF Decode Line and Data Decode Line (for digital data). Additionally the user is allowed to configure the Speaker/Headphones output and DEMOD Connector output. Configuration is set from the RF Receiver Filters Setup Menu. Filters are not editable from the RF Receive Operation Screen. The following information is displayed on the RF Receive Operation Screen:



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ITEM	DESCRIPTION

20. Filter Line

Selects Audio Line for which Filter Settings are displayed. Available selections include Modulation Meters signal (MOD MTR), AF Decode/SINAD signal (AF DECODE), AF Counter (AF-CNT), Data Decoder signal (DATA DEC), DEMOD Connector (DEMOD-OUT) and Speaker/Headphones Connector (SPKR). HP Filter (23), LP Filter (21) and BP Filter (22) Fields automatically change to reflect settings for selected Line.

Soft Function Keys available with this field include:

F1 MENU
Displays Filter Line selections.

F6 RETURN
Returns COM-120A to normal RF Receive Operation.

F6 CONFIG
Accesses Audio Filter Configuration Screen for editing all input lines.

21. Low-Pass Filter (LPF)

Displays current Low Pass Filter setting for selected filter line if active. Settings displayed include OFF, 300 Hz, 4 kHz and 20 kHz.

NOTE: High-Pass Filter/Low-Pass Filter combination and Bandpass Filter cannot be active simultaneously.

ITEM	DESCRIPTION

22. Bandpass Filter (BPF)

Displays current Bandpass Filter setting for selected filter line if active. Settings displayed include OFF and C-MSG.

NOTE: High-Pass Filter/Low-Pass Filter combination and Bandpass Filter cannot be active simultaneously.

23. High-Pass Filter (HPF)

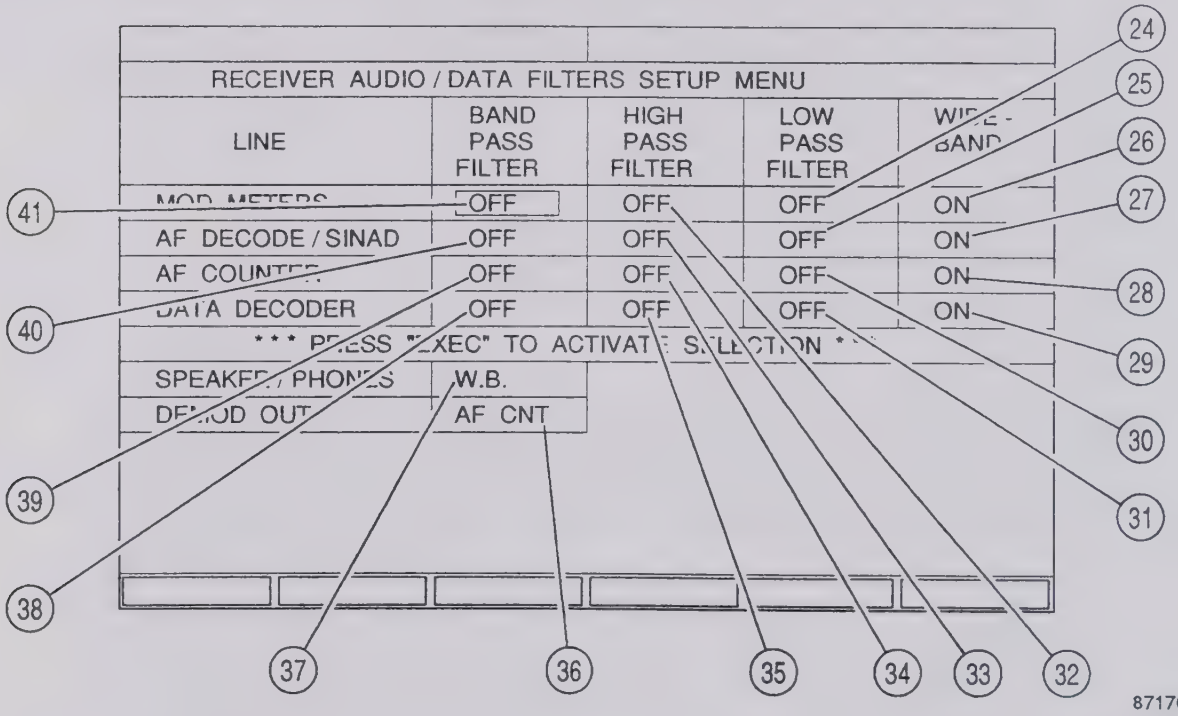
Displays current High-Pass Filter setting for selected filter line if active. Settings displayed include OFF, 300 Hz and 4 kHz.

NOTE: High-Pass Filter/Low-Pass Filter combination and Bandpass Filter cannot be active simultaneously.

Pressing CONFIG Soft Function Key F6 when the cursor is at Filter Line (20) accesses the RF Receiver Filters Setup Menu. The RF Receiver Filters Setup Menu is set up in a matrix format. Each row is a separate audio line. Each column is a separate filter line. The audio lines are the AF DECODE/SINE Line and the DATA DECODER Line. The Speaker/Headphones is on a separate row for editing filtering parameters. Specific filter columns are Bandpass Filter, High-Pass Filter, Low-Pass Filter and Wide Band Filter. Filter parameters for all RF Receiver Audio/Data Lines are editable as shown:

NOTE: High-Pass Filter/Low-Pass Filter combination and Bandpass Filter cannot be active simultaneously.

EXEC Soft Function Key F5 must be pressed after edits are made for edits to be valid when returning to any other operation mode.



ITEM	DESCRIPTION

24. MOD METERS Low-Pass Filter Field

Displays current setting for MOD METERS Low-Pass Filter. Settings available include OFF, 300 Hz, 4 kHz and 20 kHz. Setting this field to anything other than OFF automatically sets MOD METERS Bandpass Filter Field (41) to OFF.

Soft Function Keys available with this field include:

F1 OFF
Deactivates Low-Pass Filtering on MOD METERS Line.

F2 300 Hz
Routes MOD METERS Signal through 300 Hz Low-Pass Filter.

F3 4 kHz
Routes MOD METERS Signal through 4 kHz Low-Pass Filter.

F4 20 kHz
Routes MOD METERS Signal through 20 kHz Low-Pass Filter.

F5 EXEC
Executes all edits made on this screen. Edits made are not valid if EXEC Soft Function Key is not pressed before returning to operation mode.

F6 RETURN
Returns to RF Receive Operation Screen.

25. AF DECODE/SINAD Low-Pass Filter Field

Displays current setting for AF DECODE/SINAD Low-Pass Filter. Settings available include OFF, 300 Hz, 4 kHz and 20 kHz. Setting this field to anything other than OFF automatically sets AF DECODE/SINAD Bandpass Filter Field (40) to OFF.

Soft Function Keys available with this field include:

F1. OFF
Deactivates Low-Pass Filtering on AF DECODE/SINAD Line.

F2. 300 Hz
Routes AF DECODE/SINAD Signal through 300 Hz Low-Pass Filter.

F3. 4 kHz
Routes AF DECODE/SINAD Signal through 4 kHz Low-Pass Filter.

F4. 20 kHz
Routes AF DECODE/SINAD Signal through 20 kHz Low-Pass Filter.

F5. EXEC
Executes all edits made on this screen. Edits made are not valid if EXEC Soft Function Key is not pressed before returning to operation mode.

F6. RETURN
Returns to RF Receive Operation Screen.

26. MOD METERS Wideband Filter Field

Displays ON if all other filtering is OFF for MOD METERS Signal. Displays OFF if filter is used for MOD METERS signal. This field is for display only.

27. AF DECODE/SINAD Wideband Filter Field

Displays ON if all other filtering is OFF for AF DECODE/SINAD Signal. Displays OFF if filter is used for AF DECODE/SINAD signal. This field is for display only.

28. AF COUNTER Wideband Filter Field

Displays ON if all other filtering is OFF for AF COUNTER Signal. Displays OFF if filter is used for AF COUNTER signal. This field is for display only.

29. DATA DECODER Wideband Filter Field

Displays ON if all other filtering is OFF for DATA DECODER Signal. Displays OFF if filter is used for DATA DECODER signal. This field is for display only.

30. AF COUNTER Low-Pass Filter Field

Displays current setting for AF COUNTER Low-Pass Filter. Settings available include OFF, 300 Hz, 4 kHz and 20 kHz. Setting this field to anything other than OFF automatically sets AF COUNTER Bandpass Filter Field (39) to OFF.

Soft Function Keys available with this field include:

F1 OFF
Deactivates Low-Pass Filtering on AF COUNTER Line.

F2 300 Hz
Routes AF COUNTER Signal through 300 Hz Low-Pass Filter.

F3 4 kHz
Routes AF COUNTER Signal through 4 kHz Low-Pass Filter.

F4 20 kHz
Routes AF COUNTER Signal through 20 kHz Low-Pass Filter.

F5 EXEC
Executes all edits made on this screen. Edits made are not valid if EXEC Soft Function Key is not pressed before returning to operation mode.

F6 RETURN
Returns to RF Receive Operation Screen.

31. DATA DECODER Low-Pass Filter Field

Displays current setting for DATA DECODER Low-Pass Filter. Settings available include OFF, 300 Hz, 4 kHz and 20 kHz. Setting this field to anything other than OFF automatically sets DATA DECODER Bandpass Filter Field (38) to OFF.

Soft Function Keys available with this field include:

F1 OFF
Deactivates Low-Pass Filtering on DATA DECODER Line.

F2 300 Hz
Routes DATA DECODER Signal through 300 Hz Low-Pass Filter.

F3 4 kHz
Routes DATA DECODER Signal through 4 kHz Low-Pass Filter.

F4 20 kHz
Routes DATA DECODER Signal through 20 kHz Low-Pass Filter.

F5 EXEC
Executes all edits made on this screen. Edits made are not valid if EXEC Soft Function Key is not pressed before returning to operation mode.

F6 RETURN
Returns to RF Receive Operation Screen.

32. MOD METERS High-Pass Filter Field

Displays current setting for MOD METERS High-Pass Filter. Settings available include OFF, 300 Hz and 4 kHz. Setting this field to anything other than OFF automatically sets MOD METERS Bandpass Filter Field (41) to OFF.

Soft Function Keys available with this field include:

F1 OFF
Deactivates High-Pass Filtering on MOD METERS Line.

F2 300 Hz
Routes MOD METERS Signal through 300 Hz High-Pass Filter.

F3 4 kHz
Routes MOD METERS Signal through 4 kHz High-Pass Filter.

F5 EXEC
Executes all edits made on this screen. Edits made are not valid if EXEC Soft Function Key is not pressed before returning to operation mode.

F6 RETURN
Returns to RF Receive Operation Screen.

33. AF DECODE/SINAD High-Pass Filter Field

Displays current setting for AF DECODE/SINAD High-Pass Filter. Settings available include OFF, 300 Hz and 4 kHz. Setting this field to anything other than OFF automatically sets AF DECODE/SINAD Bandpass Filter Field (40) to OFF.

Soft Function Keys available with this field include:

F1 OFF
Deactivates High-Pass Filtering on AF DECODE/SINAD Line.

F2 300 Hz
Routes AF DECODE/SINAD Signal through 300 Hz High-Pass Filter.

F3 4 kHz
Routes AF DECODE/SINAD Signal through 4 kHz High-Pass Filter.

F5 EXEC
Executes all edits made on this screen. Edits made are not valid if EXEC Soft Function Key is not pressed before returning to operation mode.

F6 RETURN
Returns to RF Receive Operation Screen.

34. AF COUNTER High-Pass Filter Field

Displays current setting for AF COUNTER High-Pass Filter. Settings available include OFF, 300 Hz and 4 kHz. Setting this field to anything other than OFF automatically sets AF COUNTER Bandpass Filter Field (39) to OFF.

Soft Function Keys available with this field include:

F1 OFF
Deactivates High-Pass Filtering on AF COUNTER Line.

F2 300 Hz
Routes AF COUNTER Signal through 300 Hz High-Pass Filter.

F3 4 kHz
Routes AF COUNTER Signal through 4 kHz High-Pass Filter.

F5 EXEC
Executes all edits made on this screen. Edits made are not valid if EXEC Soft Function Key is not pressed before returning to operation mode.

F6. RETURN
Returns to RF Receive Operation Screen.

35. DATA DECODER High-Pass Filter Field

Displays current setting for DATA DECODER High-Pass Filter. Settings available include OFF, 300 Hz and 4 kHz. Setting this field to anything other than OFF automatically sets DATA DECODER Bandpass Filter Field (38) to OFF.

Soft Function Keys available with this field include:

F1 OFF
Deactivates High-Pass Filtering on DATA DECODER Line.

F2 300 Hz
Routes DATA DECODER Signal through 300 Hz High-Pass Filter.

F3 4 kHz
Routes DATA DECODER Signal through 4 kHz High-Pass Filter.

F5. EXEC
Executes all edits made on this screen. Edits made are not valid if EXEC Soft Function Key is not pressed before returning to operation mode.

F6. RETURN
Returns to RF Receive Operation Screen.

36. DEMOD Connector Filter Field

Displays current setting for DEMOD Connector Signal. One selection is the demodulated signal passed through a C-Message Weighted Filter. Other selections route the signals passed to other sections of the COM-120A to the DEMOD Connector. These signals include:

AF Counter Signal (AF CNT)
Unfiltered Demodulation Signal from the Detector (DET-OUT)
Data Decoder Signal (DAT DEC)
AF Decode/SINAD Signal (AF DECD)
Modulation Meter Signal (MOD MTR)

Soft Function Keys available with this field include:

F1 AF-CNT
Routes AF Counter Signal to DEMOD Connector.

F2 DET-OUT
Routes Detector Signal to DEMOD Connector.

F3 C-MSG
Routes Detector Signal through C-Message Weighted Filter to DEMOD Connector.

F4 DAT DEC
Routes Data Decoder Signal to DEMOD Connector.

F5 AF DECD
Routes AF Decoder/SINAD Signal to DEMOD Connector.

F6 MOD MTR
Routes Modulation Meters Signal to DEMOD Connector.

37. Speaker/Headphones Filter Field

Displays current setting for Speaker/Headphones Filter. Settings available include OFF, C-MSG (C-Message Weighted Filter), W.B. (Wideband) and INT-MOD (Internal Modulation). The first three selections relate to the audio being sent to the AUDIO/DATA IN connector. The last selection is the composite modulation signal being generated by the COM-120A.

Soft Function Keys available with this field include:

F1 OFF
Sets Speaker/Headphones operation to OFF.

F2 C-MSG
Routes Audio signal from AUDIO/DATA IN Connector through C-Message Weighted Bandpass Filter to Speaker and PHONES Connector.

F3 W.B.
Routes Audio signal from AUDIO/DATA IN Connector to Speaker and PHONES Connector without filtering.

F4 Aud-Gen
Routes Audio signal from internal Audio/Data/Signaling Generators, as composite signal, to Speaker and PHONES Connector.

38. DATA DECODER Bandpass Filter Field

Displays current setting for DATA DECODER Bandpass Filter. Settings available include OFF and C-MSG. Setting this field to anything other than OFF automatically sets DATA DECODER High-Pass Filter Field (35) and DATA DECODER Low-Pass Filter Field (31) to OFF.

Soft Function Keys available with this field include:

F1 OFF
Deactivates Bandpass Filtering on DATA DECODER Line.

F2 C-MSG
Routes DATA DECODER Signal through C-Message Weighted Bandpass Filter.

F5 EXEC
Executes all edits made on this screen. Edits made are not valid if EXEC Soft Function Key is not pressed before returning to operation mode.

F6 RETURN
Returns to RF Receive Operation Screen.

39. AF COUNTER Bandpass Filter Field

Displays current setting for AF COUNTER Bandpass Filter. Settings available include OFF and C-MSG. Setting this field to anything other than OFF automatically sets AF COUNTER High-Pass Filter Field (34) and AF COUNTER Low-Pass Filter Field (30) to OFF.

Soft Function Keys available with this field include:

F1 OFF
Deactivates Bandpass Filtering on AF COUNTER Line.

F2 C-MSG
Routes AF COUNTER Signal through C-Message Weighted Bandpass Filter.

F5 EXEC
Executes all edits made on this screen. Edits made are not valid if EXEC Soft Function Key is not pressed before returning to operation mode.

F6 RETURN
Returns to RF Receive Operation Screen.

40. AF DECODE/SINAD Bandpass Filter Field

Displays current setting for AF DECODE/SINAD Bandpass Filter. Settings available include OFF and C-MSG. Setting this field to anything other than OFF automatically sets AF DECODE/SINAD High-Pass Filter Field (33) and AF DECODE/SINAD Low-Pass Filter Field (25) to OFF.

Soft Function Keys available with this field include:

F1 OFF
Deactivates Bandpass Filtering on AF DECODE/SINAD Line.

F2 C-MSG
Routes AF DECODE/SINAD Signal through C-Message Weighted Bandpass Filter.

F5 EXEC
Executes all edits made on this screen. Edits made are not valid if EXEC Soft Function Key is not pressed before returning to operation mode.

F6 RETURN
Returns to RF Receive Operation Screen.

41. MOD METERS Bandpass Filter Field

Displays current setting for MOD METERS Bandpass Filter. Settings available include OFF and C-MSG. Setting this field to anything other than OFF automatically sets MOD METERS High-Pass Filter Field (32) and MOD METERS Low-Pass Filter Field (24) to OFF.

Soft Function Keys available with this field include:

F1 OFF
Deactivates Bandpass Filtering on MOD METERS Line.

F2 C-MSG
Routes MOD METERS Signal through C-Message Weighted Bandpass Filter.

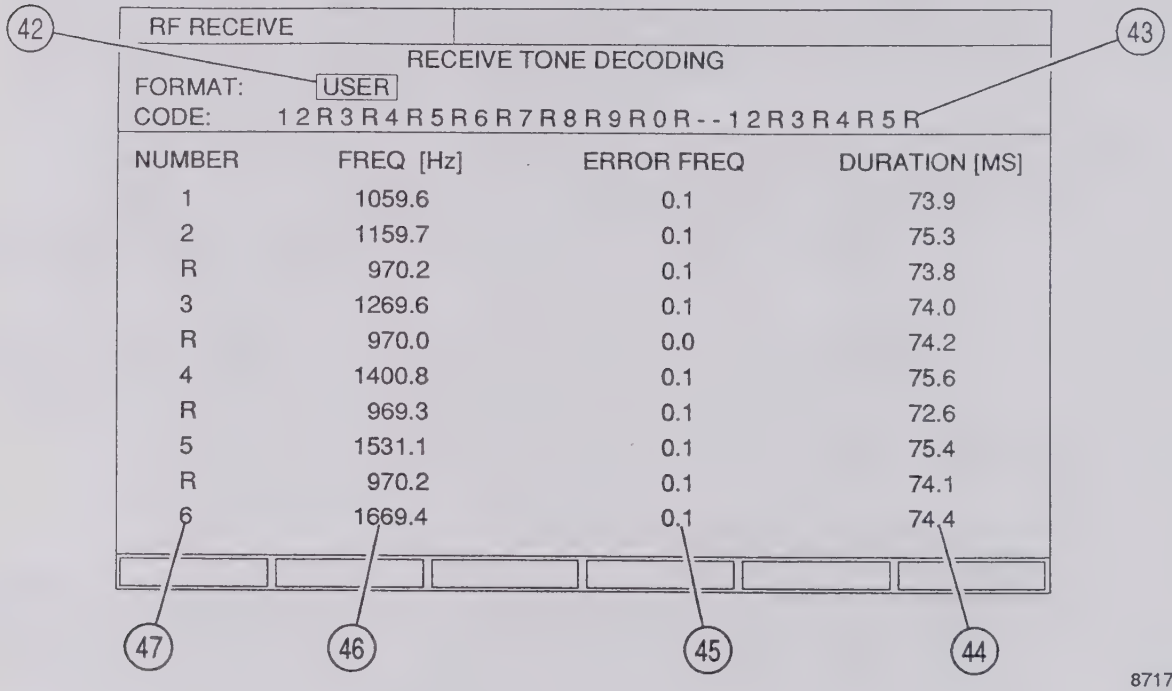
F5 EXEC
Executes all edits made on this screen. Edits made are not valid if EXEC Soft Function Key is not pressed before returning to operation mode.

F6 RETURN
Returns to RF Receive Operation Screen.

C. DECODING SCREENS

Pressing DECODE Soft Function Key F2 from TONE/DATA CODE Field (11) accesses Tone Decode Screen when Tone/Data Type is Signalling Format.

Information provided the user from the Tone Decode Screen is displayed below:



8717037

ITEM	DESCRIPTION

42. FORMAT

Displays selected Signalling Format for decoding. Selections are limited to USER for standard configuration. Additional selections are shown, but are unusable unless Option 09 or Option 11 is installed. Refer to Section 6 for information on Options. Additional selections available include:

CCIR	CCIRH	CCIRH4
EEA	EIA	NATEL
ZVEI	DZVEI	DDZVEI
EURO	5/6 TONE	

Soft Function Keys available with this field include:

F1 MENU
Displays Menu of Signalling Format selections.

F2 DECODE
Activates Decode Function. Field is highlighted when Decode Function is active.

F3 PG UP
Pages screen up to view decoded information.

F4. PG DN
Pages screen down to view decoded information.

F6. RETURN
Returns to RF Receive Operation Screen.

43. Code Field

Displays Decoded message by character.

44. DURATION Column

Displays Duration of each message element in milliseconds (ms).

45. ERROR FREQ Column

Displays difference of received tone frequency from expected tone for each message element in Hertz (Hz).

46. FREQ Column

Displays received tone frequency for each message element in Hertz (Hz).

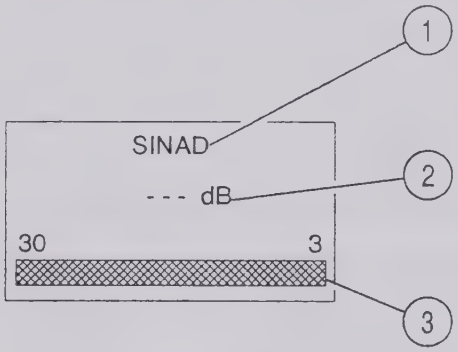
47. NUMBER Column

Displays each character in message.

D. SINAD METER

The SINAD Meter for the RF Receive Operation Screen measures SINAD for a 1 kHz tone modulation for an RF signal passed to the RF Receiver. The RF signal is demodulated and filtered before being passed to the SINAD Meter. Filtering for the signal passed to the SINAD Meter is provided by the Audio/Data Filters. Refer to para 3-3-2(B) for information on filters available.

The SINAD Meter can be shown as reading in dB only or as a meter. Information provided from the RF Receive Operation Screen is displayed as follows:



8717040

ITEM	DESCRIPTION

1. SINAD/Distortion/Modulation Meter Label

Displays label for selected Meter Operation. Selections include SINAD, Distortion and Modulation Meters. Refer to para 3-3-2(E) for description of Distortion Meter, para 3-3-2(F) for information on FM Deviation Meter, 3-3-2(G) for information on AM Modulation Meter and para 3-3-2(H) for information on Phase Modulation Meter.

Soft Function Keys available with this field include:

F1 ZOOM
Expands current meter into full-size meter.

F2 SINAD
Selects SINAD Meter as active meter. Not displayed if meter is active.

F3 DIST
Selects Distortion Meter as active meter. Not displayed if meter is active.

F4 DEV
Selects Modulation Meter associated with Demodulation type as active meter. Not displayed if meter is active.

ITEM	DESCRIPTION

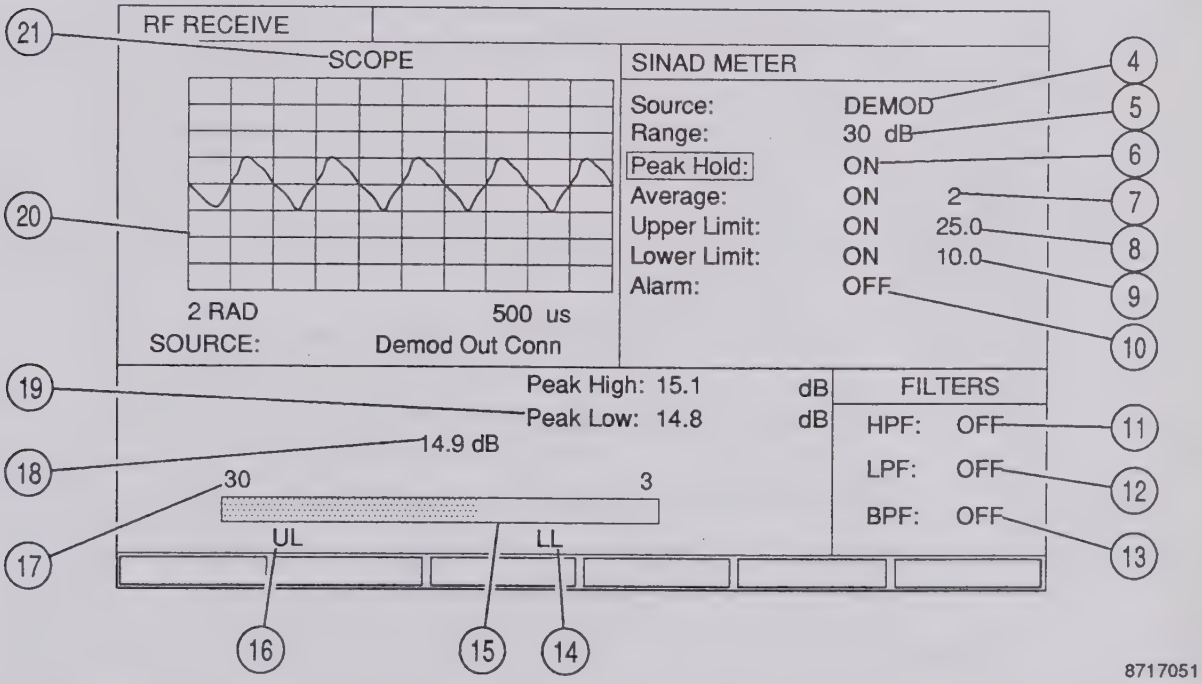
2. Meter Reading

   Displays current SINAD Meter Reading in dB.

3. Meter Bar

   Provides graphical display of current SINAD Meter reading in dB.

Pressing ZOOM Soft Function Key F1 when cursor is at SINAD/Distortion/Modulation Meter Label (1) accesses full screen SINAD Meter. Available features and editable fields are as follows:



8717051

ITEM	DESCRIPTION

4. Source

   Displays DEMOD, indicating signal source for SINAD measurement is demodulated signal. Field is for display only.

5. Range

   Displays selected SINAD Meter Upper Range. Selections include Autorange, 15 dB and 30 dB.

Soft Function Keys available with this function include:

F1 15 dB
Selects 15 dB as active upper range for SINAD Meter.

F2 30 dB
Selects 30 dB as active upper range for SINAD Meter.

F3 AUTO
Selects Autorange as active upper range for SINAD Meter. This setting automatically adjusts to a higher or lower upper range if signal increases or decreases to a specified level of the current setting.

F5 RST PK
Resets Peak Readings displayed to 0.

F6 RETURN
Returns Test Set to normal RF Receive Operation Screen.

6. Peak Hold

Displays current status of Peak Hold function. Displays OFF or ON. When ON, Peak Readings (19) are displayed.

Soft Function Keys available with this function include:

F1 OFF/ON
Toggles Peak Hold Function ON and OFF.

F5 RST PK
Resets Peak Hold Function.

F6 RETURN
Returns Test Set to Normal RF Receiver Operation.

7. Average

Displays current status of Averaging Function and number of samples when active. Status is OFF or ON. Averaging Function averages a selected number of readings and reports average as Digital Readout (18). Range is 2 to 10.

Soft Function Keys available with this function include:

F1 OFF/ON
Toggles Average Function On and Off.

F5 RST PK
Resets Peak Hold Function.

F6 RETURN
Returns Test Set to Normal RF Receiver Operation.

8. Upper Limit

Displays current status of Upper Limit Function and Upper Limit value when active. Status is OFF or ON. Range is 0 to 30 dB. When ON, Upper Limit Bar (16) is displayed.

Soft Function Keys available with this function include:

F1 OFF/ON
Toggles Upper Limit Function On and Off.

F5 RST PK
Resets Peak Hold Function.

F6 RETURN
Returns Test Set to Normal RF Receiver Operation.

9. Lower Limit

Displays current status of Lower Limit Function and Lower Limit value when active. Status is OFF or ON. Range is 0 to 30 dB. When ON, Lower Limit Bar (14) is displayed.

Soft Function Keys available with this function include:

F1 OFF/ON
Toggles Lower Limit Function On and Off.

F5 RST PK
Resets Peak Hold Function.

F6 RETURN
Returns Test Set to Normal RF Receiver Operation.

10. Alarm

Displays current status of Alarm Function. Status is OFF or ON. When ON, alarm sounds when signal exceeds Upper Limit (8) or is below Lower Limit (9).

Soft Function Keys available with this function include:

F1 OFF/ON
Toggles Alarm Function On and Off.

F5 RST PK
Resets Peak Hold Function.

F6 RETURN
Returns Test Set to Normal RF Receiver Operation.

ITEM	DESCRIPTION

11. High-Pass Filter (HPF)

    Displays current High-Pass Filter setting for SINAD Meter.

12. Low-Pass Filter (LPF)

    Displays current Low-Pass Filter setting for SINAD Meter.

13. Bandpass Filter (BPF)

    Displays current Bandpass Filter setting for SINAD Meter.

14. Lower Limit Bar

    Indicates position of Lower Limit (9) on Bar Meter (15). If Lower Limit (9) exceeds Range (5), marker is not visible.

15. Bar Meter

    Relative Graphic display of current SINAD Meter reading.

16. Upper Limit Bar

    Indicates position of Upper Limit (8) on Bar Meter (15). If Upper Limit (8) exceeds Range (5), marker is not visible.

17. Upper Range Limit Readout

    Displays current value of Range (5). Redefined as needed if Autorange function is active.

18. Digital Readout

    Displays current SINAD Meter Reading.

19. Peak Readings

    Displays current high and low Peak Readings when Peak Hold (6) is set to ON. Readings are reinitialized when RST PK Soft Function Key F5 is pressed.

20. SCOPE/ANALYZER Screen

    Displays digitized trace of specified signal as Oscilloscope or Spectrum Analyzer.

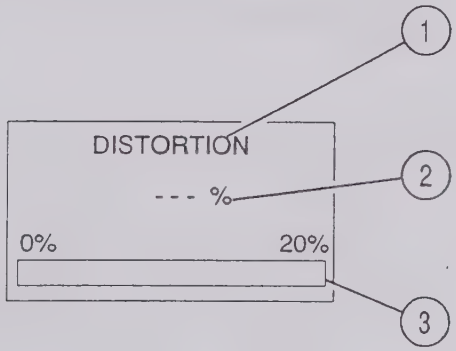
21. SCOPE/ANALYZER Prompt

    Displays current operation function. Used to toggle between two functions. Refer to para 3-3-2(M) for information on RF Receiver Oscilloscope Operation and para 3-3-2(N) for information on RF Receiver Spectrum Analyzer Operation.

E. DISTORTION METER

The Distortion Meter for the RF Receive Operation Screen measures Percent Distortion for a 1 kHz tone modulation for an RF signal passed to the RF Receiver. The RF signal is demodulated and filtered before being passed to the Distortion Meter. Filtering for the signal passed to the Distortion Meter is provided by the Audio/Data Filters. Refer to para 3-3-2(B) for information on filters available.

The Distortion Meter can be shown as reading in % Distortion only or as a meter. Information provided from the RF Receive Operation Screen is displayed as follows:



8717044

ITEM	DESCRIPTION

1. SINAD/Distortion/Modulation Meter Label

   Displays label for selected Meter Operation. Selections include SINAD, Distortion and Modulation Meters. Refer to para 3-3-2(D) for description of SINAD Meter, para 3-3-2(F) for information on FM Deviation Meter, para 3-3-2(G) for information on AM Modulation Meter and para 3-3-2(H) for information on Phase Modulation Meter.

   Soft Function Keys available with this field include:

   F1 ZOOM
   Expands current meter into full-size meter.

   F2 SINAD
   Selects SINAD Meter as active meter. Not displayed if meter is active.

   F3 DIST
   Selects Distortion Meter as active meter. Not displayed if meter is active.

   F4 DEV
   Selects Modulation Meter associated with Demodulation type as active meter. Not displayed if meter is active.

ITEM DESCRIPTION

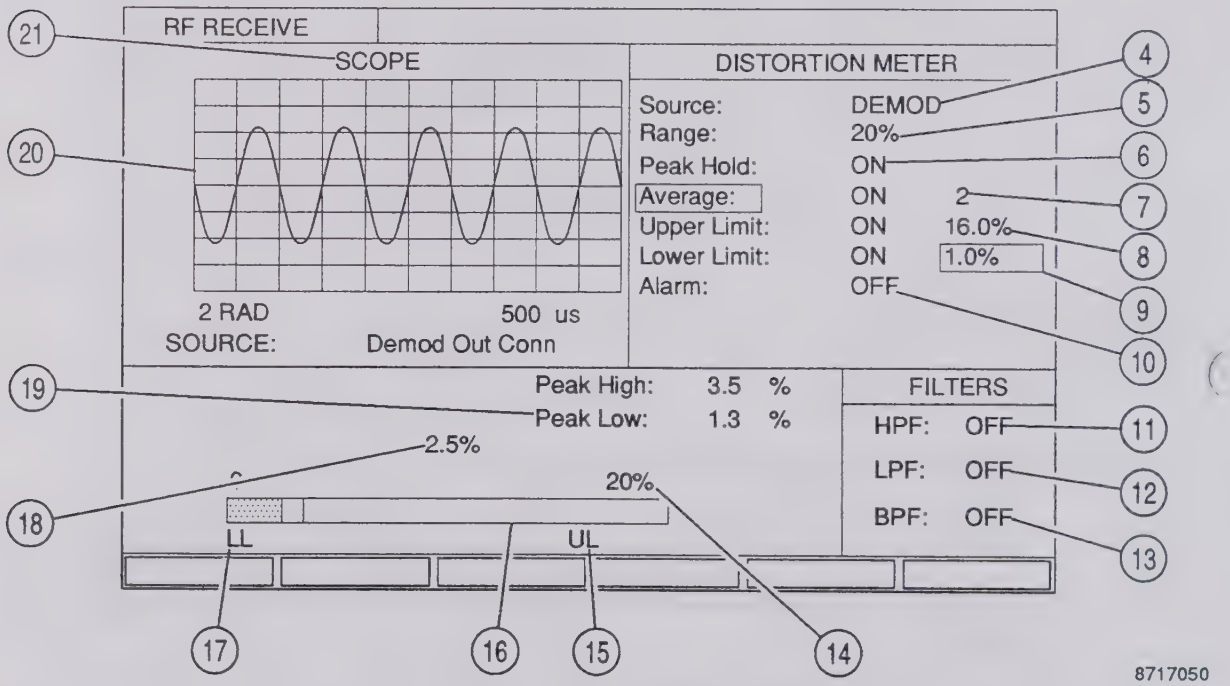
2. Meter Reading

Displays current Distortion Meter Reading in % Distortion.

3. Meter Bar

Provides graphical display of current Distortion Meter reading in % Distortion.

Pressing ZOOM Soft Function Key F1 when cursor is at SINAD/Distortion/Modulation Meter Label (1) accesses full screen Distortion Meter. Available features and editable fields are listed as follows:



8717050

ITEM DESCRIPTION

4. Source

Displays DEMOD, indicating signal source for Distortion measurement is demodulated signal. Field is for display only.

5. Range

Displays Distortion Meter Upper Range of 20%. Field is for display only.

6. Peak Hold

Displays current status of Peak Hold function. Displays OFF or ON. When ON, Peak Readings (19) are displayed.

Soft Function Keys available with this function include:

F1 OFF/ON
Toggles Peak Hold Function ON and OFF.

F5 RST PK
Resets Peak Hold Function.

F6 RETURN
Returns Test Set to Normal RF Receiver Operation.

7. Average

Displays current status of Averaging Function and number of samples when active. Status is OFF or ON. Averaing Function averages selected number of readings and reports average as Digital Readout (18). Range of samples is 2 to 10.

Soft Function Keys available with this function include:

F1 OFF/ON
Toggles Average Function ON and OFF.

F5 RST PK
Resets Peak Hold Function.

F6 RETURN
Returns Test Set to Normal RF Receiver Operation.

8. Upper Limit

Displays current status of Upper Limit Function and Upper Limit value when active. Status is OFF or ON. Range of value is 0 to 20%. When ON, Upper Limit Bar (15) is displayed.

Soft Function Keys available with this function include:

F1 OFF/ON
Toggles Upper Limit Function ON and OFF.

F5 RST PK
Resets Peak Hold Function.

F6 RETURN
Returns Test Set to Normal RF Receiver Operation.

9. Lower Limit

Displays current status of Lower Limit Function and Lower Limit value when active. Status is OFF or ON. Range of value is 0 to 20%. When ON, Lower Limit Bar (17) is displayed.

Soft Function Keys available with this function include:

F1 OFF/ON
Toggles Lower Limit Function ON and OFF.

F5 RST PK
Resets Peak Hold Function.

F6 RETURN
Returns Test Set to Normal RF Receiver Operation.

10. Alarm

Displays current status of Alarm Function. Status is OFF or ON. When ON, Audible alarm sounds when signal exceeds Upper Limit (8) or is below Lower Limit (9).

Soft Function Keys available with this function include:

F1 OFF/ON
Toggles Alarm Function ON and OFF.

F5 RST PK
Resets Peak Hold Function.

F6 RETURN
Returns Test Set to Normal RF Receiver Operation.

11. High-Pass Filter (HPF)

Displays current High-Pass Filter setting for Distortion Meter.

12. Low-Pass Filter (LPF)

Displays current Low-Pass Filter setting for Distortion Meter.

13. Bandpass Filter (BPF)

Displays current Bandpass Filter setting for Distortion Meter.

14. Upper Range Limit Readout

Displays current value of Range (5). Redefined as needed if Autorange function is active.

15. Upper Limit Bar

Indicates position of Upper Limit (8) on Bar Meter (16). If Upper Limit (8) exceeds Range (5), marker is not visible.

16. Bar Meter

Relative Graphic display of current Distortion Meter reading.

ITEM	DESCRIPTION

17. Lower Limit Bar

    Indicates position of Lower Limit (9) on Bar Meter (14). If Lower Limit (9) exceeds Range (5), marker is not visible.

18. Digital Readout

    Displays current Distortion Meter Reading.

19. Peak Readings

    Displays current high and low Peak readings when Peak Hold (6) is set to ON. Readings are reinitialized when RST PK Soft Function Key F5 is pressed.

20. SCOPE/ANALYZER Screen

    Displays digitized trace of specified signal as Oscilloscope or Spectrum Analyzer.

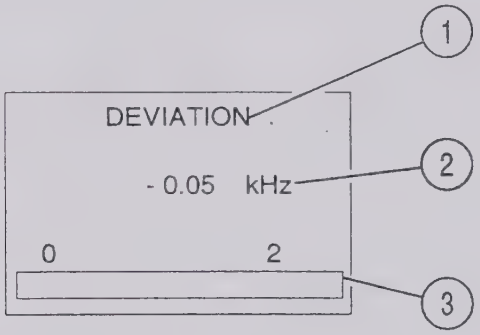
21. SCOPE/ANALYZER Prompt

    Displays current operation function. Used to toggle between two functions. Refer to para 3-3-2(M) for information on RF Receiver Oscilloscope Operation and para 3-3-2(N) for information on RF Receiver Spectrum Analyzer Operation.

F. FM DEVIATION METER

The FM Deviation Meter for the RF Receive Operation Screen measures FM Deviation for an RF signal passed to the RF Receiver. The RF signal is demodulated and filtered before being passed to the FM Deviation Meter. Filtering for the signal passed to the FM Deviation Meter is provided by the Audio/Data Filters. Refer to para 3-3-2(B) for information on filters available.

The FM Deviation Meter can be shown as reading in kHz only or as a meter. Information provided from the RF Receive Operation Screen is displayed as follows:



8717052

ITEM	DESCRIPTION

1. SINAD/Distortion/Modulation Meter Label

   Displays label for selected Meter Operation. Selections include SINAD, Distortion and Modulation Meters. Refer to para 3-3-2(D) for description of SINAD Meter, para 3-3-2(E) for information on Distortion Meter, para 3-3-2(G) for information on AM Modulation Meter and para 3-3-2(H) for information on Phase Modulation Meter.

   Soft Function Keys available with this field include:

   F1 ZOOM
   Expands current meter into full-size meter.

   F2 SINAD
   Selects SINAD Meter as active meter. Not displayed if meter is active.

   F3 DIST
   Selects Distortion Meter as active meter. Not displayed if meter is active.

   F4 DEV
   Selects Modulation Meter associated with Demodulation type as active meter. Not displayed if meter is active.

ITEM	DESCRIPTION

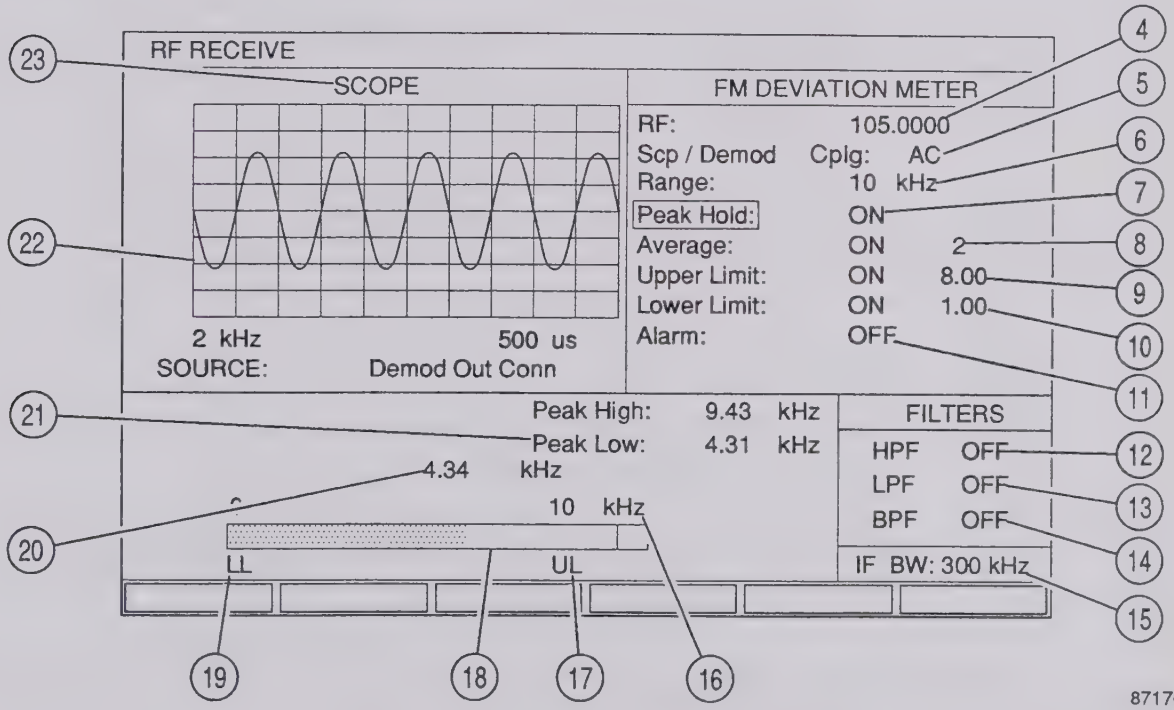
2. Meter Reading

   Displays current FM Deviation Meter Reading in kHz.

3. Meter Bar

   Provides graphical display of current FM Deviation Meter reading in kHz.

Pressing ZOOM Soft Function Key F1 when cursor is at SINAD/Distortion/Modulation Meter Label (1) accesses full screen FM Deviation Meter. Available features and editable fields are as follows:



8717048

ITEM	DESCRIPTION

4. RF

   Displays selected RF Receiver Frequency. Selections range from .250 to 1000 MHz.

5. Scope/DEMOD Connector Coupling

   Displays selected coupling for Oscilloscope and DEMOD Connector. Selections are AC or DC.

Soft Function Keys available with this field include:

F1 AC
Selects AC Coupling for Oscilloscope and DEMOD Connector.

F2 DC
Selects DC Coupling for Oscilloscope and DEMOD Connector.

F6. RETURN
Returns unit to RF Receive Operation Screen.

6. Range

Displays selected FM Deviation Meter Upper Range. Selections include Autorange and the following:

2 kHz	5 kHz	10 kHz
20 kHz	50 kHz	100 kHz

Soft Function Keys available with this field include:

F1 MENU
Accesses Menu to set Oscilloscope Scale.

F2 AUTO
Selects Autorange for Deviation Meter Range.

F5 RST PK
Resets Peak Deviation Meter readings.

F6. RETURN
Returns unit to RF Receive Operation Screen.

7. Peak Hold

Displays current status of Peak Hold function. Displays OFF or ON. When ON, Peak Readings (21) are displayed.

Soft Function Keys available with this function include:

F1 OFF/ON
Toggles Peak Hold Function On and Off.

F5 RST PK
Resets Peak Hold Function.

F6 RETURN
Returns Test Set to Normal RF Receiver Operation.

ITEM	DESCRIPTION

8. Average

Displays current status of Averaging Function and number of samples when active. Status is OFF or ON. Averaging Function averages selected number of readings and reports average as Digital Readout (20). Range is 2 to 10.

Soft Function Keys available with this function include:

F1 OFF/ON
Toggles Average Function ON and OFF.

F5 RST PK
Resets Peak Hold Function.

F6 RETURN
Returns Test Set to Normal RF Receiver Operation.

9. Upper Limit

Displays current status of Upper Limit Function and Upper Limit value when active. Status is OFF or ON. Range is 0 to 100 kHz. When ON, Upper Limit Bar (17) is displayed.

Soft Function Keys available with this function include:

F1 OFF/ON
Toggles Upper Limit Function ON and OFF.

F5 RST PK
Resets Peak Hold Function.

F6 RETURN
Returns Test Set to Normal RF Receiver Operation.

10. Lower Limit

Displays current status of Lower Limit Function and Lower Limit value when active. Status is OFF or ON. Range is 0 to 100 kHz. When ON, Lower Limit Bar (19) is displayed.

Soft Function Keys available with this function include:

F1 OFF/ON
Toggles Lower Limit Function ON and OFF.

F5 RST PK
Resets Peak Hold Function.

F6 RETURN
Returns Test Set to Normal RF Receiver Operation.

11. Alarm

Displays current status of Alarm Function. Status is OFF or ON. When ON, Audible alarm sounds when signal exceeds Upper Limit (9) or is below Lower Limit (10).

Soft Function Keys available with this function include:

F1 OFF/ON
Toggles Alarm Function ON and OFF.

F5 RST PK
Resets Peak Hold Function.

F6 RETURN
Returns Test Set to Normal RF Receiver Operation.

12. High-Pass Filter (HPF)

Displays current High-Pass Filter setting for FM Deviation Meter.

13. Low-Pass Filter(LPF)

Displays current Low-Pass Filter setting for FM Deviation Meter.

14. Bandpass Filter (BPF)

Displays current Bandpass Filter setting for FM Deviation Meter.

15. IF Bandwidth

Displays selected IF Bandwidth. Selections include 15 and 300 kHz.

Soft Function Keys available with this field include:

F1 300 kHz
Selects 300 kHz bandpass filter as active filter.

F2 15 kHz
Selects 15 kHz bandpass filter as active filter.

16. Upper Range Limit Readout

Displays current value of Range (6). Redefined as needed if Autorange function is active.

17. Upper Limit Bar

Indicates position of Upper Limit (9) on Bar Meter (18). If Upper Limit (9) exceeds Range (6), marker is not visible.

ITEM	DESCRIPTION

18. Bar Meter

    Relative Graphic display of current FM Deviation Meter reading.

19. Lower Limit Bar

    Indicates position of Lower Limit (10) on Bar Meter (18). If Lower Limit (10) exceeds Range (6), marker is not visible.

20. Digital Readout

    Displays current FM Deviation Meter Reading.

21. Peak Readings

    Displays current high and low Peak readings when Peak Hold (7) is set to ON. Readings are reinitialized when RST PK Soft Function Key F5 is pressed.

22. SCOPE/ANALYZER Screen

    Displays digitized trace of specified signal as Oscilloscope or Spectrum Analyzer.

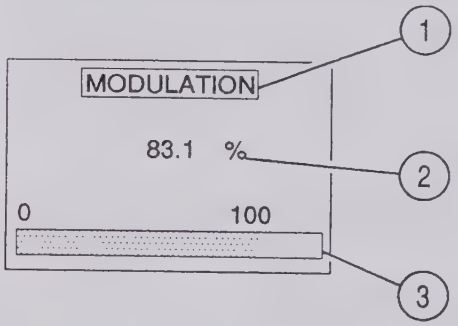
23. SCOPE/ANALYZER Prompt

    Displays current operation function. Used to toggle between two functions. Refer to para 3-3-2(M) for information on RF Receiver Oscilloscope Operation and para 3-3-2(N) for information on RF Receiver Spectrum Analyzer Operation.

G. AM MODULATION METER

The AM Modulation Meter for the RF Receive Operation Screen measures AM Modulation for an RF signal passed to the RF Receiver. The RF signal is demodulated and filtered before being passed to the AM Modulation Meter. Filtering for the signal passed to the AM Modulation Meter is provided by the Audio/Data Filters. Refer to para 3-3-2(B) for information on filters available.

The AM Modulation Meter can be shown as reading in % only or as a meter. Information provided from the RF Receive Operation Screen is displayed as follows:



8717058

ITEM	DESCRIPTION

1. SINAD/Distortion/Modulation Meter Label

   Displays label for selected Meter Operation. Selections include SINAD, Distortion and Modulation Meters. Refer to para 3-3-2(D) for description of SINAD Meter, para 3-3-2(E) for information on Distortion Meter, para 3-3-2(F) for information on FM Deviation Meter and para 3-3-2(H) for information on Phase Modulation Meter.

   Soft Function Keys available with this field include:

   F1 ZOOM
   Expands current meter into full-size meter.

   F2 SINAD
   Selects SINAD Meter as active meter. Not displayed if meter is currently active.

   F3 DIST
   Selects Distortion Meter as active meter. Not displayed if meter is currently active.

   F4 DEV
   Selects Modulation Meter associated with Demodulation type as active meter. Not displayed if meter is currently active.

2. Meter Reading

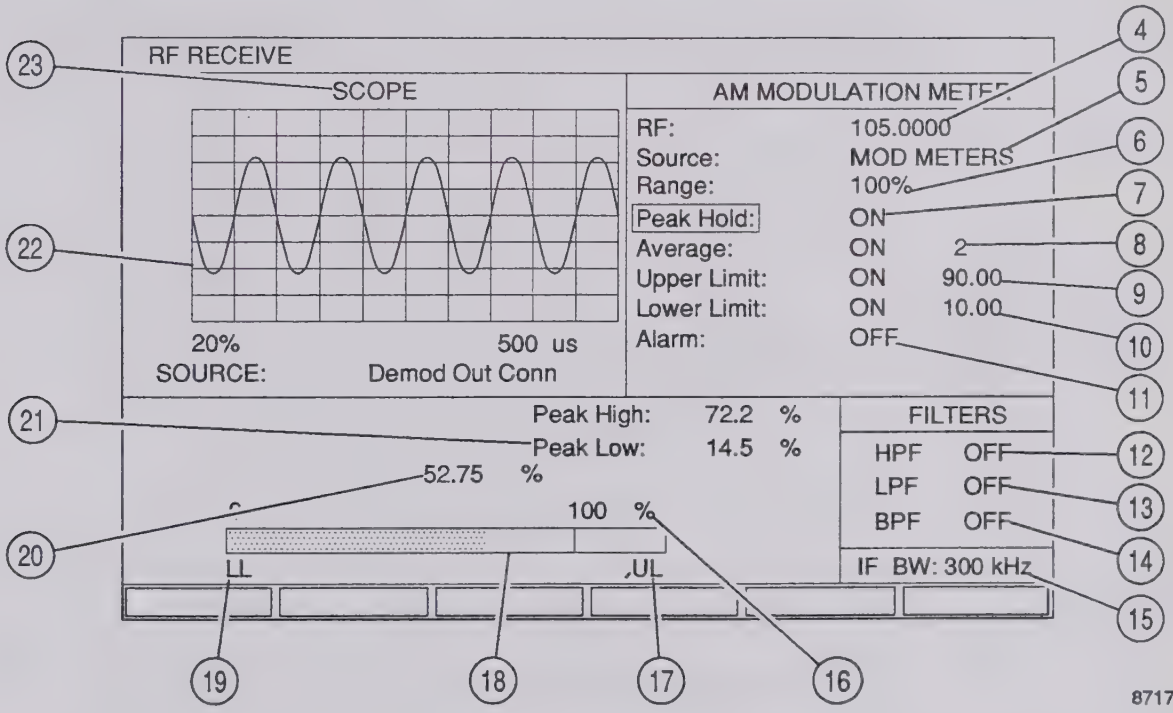
   Displays current AM Modulation Meter Reading in % Modulation.

ITEM	DESCRIPTION

3. Meter Bar

   Provides graphical display of current AM Modulation Meter reading in % Modulation.

Pressing ZOOM Soft Function Key F1 when cursor is at SINAD/Distortion/Modulation Meter Label (1) accesses full screen AM Modulation Meter. Available features and editable fields are as follows:



ITEM	DESCRIPTION

4. RF

   Displays selected RF Receiver Frequency. Selections range from .250 to 1000 MHz.

5. Source

   Displays MOD METERS as active source. Field is for display only.

6. Range

   Displays selected AM Modulation Meter Upper Range. Selections include Autorange, 40% and 100%.

Soft Function Keys available with this function include:

F1 40%
Selects 40% as active upper range for AM Moduation Meter.

F2 100%
Selects 100% as active upper range for AM Modulation Meter.

F3 AUTO
Selects Autorange as active upper range for AM Modulation Meter. This setting automatically adjusts to higher or lower upper range if signal increases or decreases to specified level of current setting.

F5 RST PK
Resets Peak Deviation Meter readings.

F6 RETURN
Returns unit to RF Receive Operation Screen.

7. Peak Hold

Displays current status of Peak Hold function. Displays OFF or ON. When ON, Peak Readings (21) are displayed.

Soft Function Keys available with this function include:

F1 OFF/ON
Toggles Peak Hold Function ON and OFF.

F5 RST PK
Resets Peak Hold Function.

F6 RETURN
Returns Test Set to Normal RF Receiver Operation.

8. Average

Displays current status of Averaging Function and number of samples when active. Status is OFF or ON. Averaging Function averages selected number of readings and reports average as Digital Readout (20). Range of samples is 2 to 10.

Soft Function Keys available with this function include:

F1 OFF/ON
Toggles Average Function ON and OFF.

F5 RST PK
Resets Peak Hold Function.

F6 RETURN
Returns Test Set to Normal RF Receiver Operation.

9. Upper Limit

Displays current status of Upper Limit Function and Upper Limit value when active. Status is OFF or ON. Range is 0% to 100%. When ON, Upper Limit Bar (17) is displayed.

Soft Function Keys available with this function include:

F1 OFF/ON
Toggles Upper Limit Function ON and OFF.

F5 RST PK
Resets Peak Hold Function.

F6 RETURN
Returns Test Set to Normal RF Receiver Operation.

10. Lower Limit

Displays current status of Lower Limit Function and Lower Limit value when active. Status is OFF or ON. Range is 0% to 100%. When ON, Lower Limit Bar (19) is displayed.

Soft Function Keys available with this function include:

F1 OFF/ON
Toggles Lower Limit Function ON and OFF.

F5 RST PK
Resets Peak Hold Function.

F6 RETURN
Returns Test Set to Normal RF Receiver Operation.

11. Alarm

Displays current status of Alarm Function. Status is OFF or ON. When ON, Audible alarm sounds when signal exceeds Upper Limit (9) or is below Lower Limit (10).

Soft Function Keys available with this function include:

F1 OFF/ON
Toggles Alarm Function ON and OFF.

F5 RST PK
Resets Peak Hold Function.

F6 RETURN
Returns Test Set to Normal RF Receiver Operation.

12. High-Pass Filter (HPF)

    Displays current High-Pass Filter setting for AM Modulation Meter.

13. Low-Pass Filter (LPF)

    Displays current Low-Pass Filter setting for AM Modulation Meter.

14. Bandpass Filter (BPF)

    Displays current Bandpass Filter setting for AM Modulation Meter.

15. IF Bandwidth

    Displays selected IF Bandwidth. Selections include 15 and 300 kHz.

    Soft Function Keys available with this field include:

    F1 300 kHz
    Selects 300 kHz bandpass filter as active filter.

    F2 15 kHz
    Selects 15 kHz bandpass filter as active filter.

16. Upper Range Limit Readout

    Displays current value of Range (6). Redefined as needed if Autorange function is active.

17. Upper Limit Bar

    Indicates position of UPPER LIMIT (9) on Bar Meter (18). If Upper Limit (9) exceeds Range (6), marker is not visible.

18. Bar Meter

    Relative Graphic display of current AM Modulation Meter reading.

19. Lower Limit Bar

    Indicates position of Lower Limit (10) on Bar Meter (18). If Lower Limit (10) exceeds RANGE (6), marker is not visible.

20. Digital Readout

    Displays current AM Modulation Meter Reading.

21. Peak Readings

    Displays current high and low Peak readings when Peak Hold (7) is set to ON. Readings are reinitialized when RST PK Soft Function Key F5 is pressed.

ITEM	DESCRIPTION

22. SCOPE/ANALYZER Screen

Displays digitized trace of specified signal as Oscilloscope or Spectrum Analyzer.

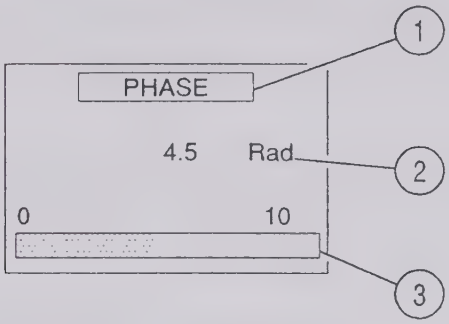
23. SCOPE/ANALYZER Prompt

Displays current operation function. Used to toggle between two functions. Refer to para 3-3-2(M) for information on RF Receiver Oscilloscope Operation and para 3-3-2(N) for information on RF Receiver Spectrum Analyzer Operation.

H. PHASE MODULATION METER

The Phase Modulation Meter for the RF Receive Operation Screen measures AM Modulation for an RF signal passed to the RF Receiver. The RF signal is demodulated and filtered before being passed to the Phase Modulation Meter. Filtering for the signal passed to the Phase Modulation Meter is provided by the Audio/Data Filters. Refer to para 3-3-2(B) for information on filters available.

The Phase Modulation Meter can be shown as reading in Radians only or as a meter. Information provided from the RF Receive Operation Screen is displayed as follows:



8717060

ITEM	DESCRIPTION

1. SINAD/Distortion/Modulation Meter Label

   Displays label for selected Meter Operation. Selections include SINAD, Distortion and Modulation Meters. Refer to para 3-3-2(D) for description of SINAD Meter, para 3-3-2(E) for information on Distortion Meter, para 3-3-2(F) for information on FM Deviation Meter and para 3-3-2(G) for information on AM Modulation Meter.

   Soft Function Keys available with this field include:

   F1 ZOOM
   Expands current meter into full-size meter.

   F2 SINAD
   Selects SINAD Meter as active meter. Not displayed if meter is active.

   F3 DIST
   Selects Distortion Meter as active meter. Not displayed if meter is active.

   F4 DEV
   Selects Modulation Meter associated with Demodulation type as active meter. Not displayed if meter is active.

2. Meter Reading

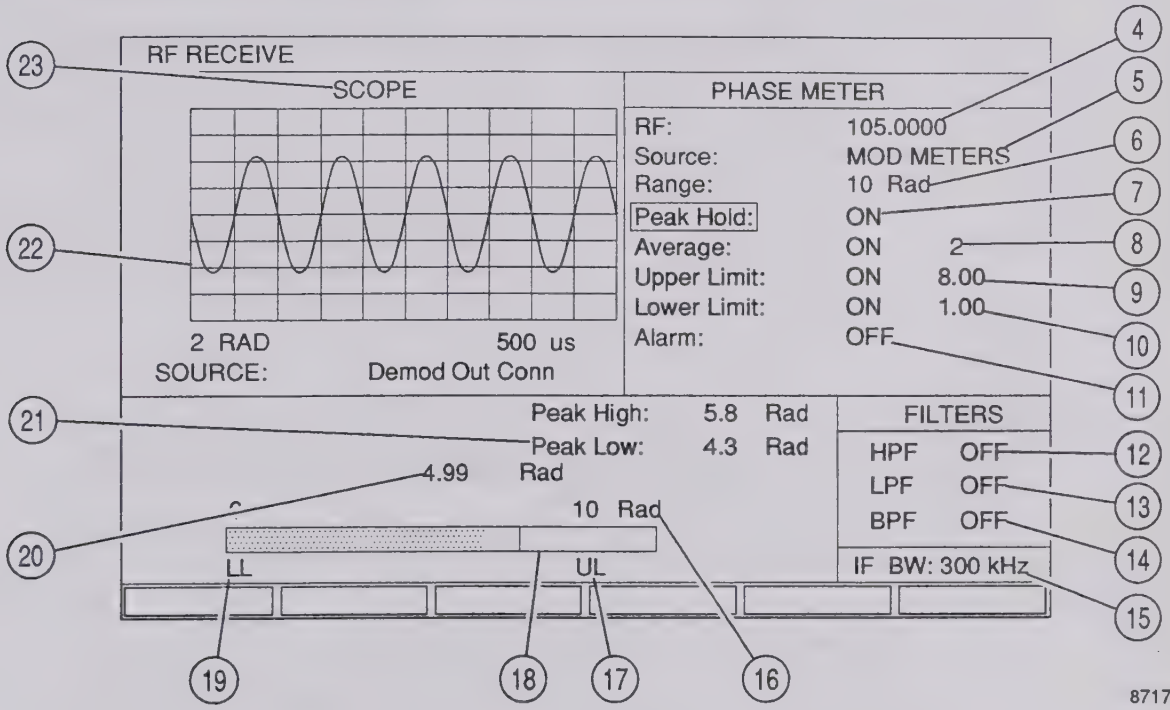
   Displays current Phase Modulation Meter Reading in Radians.

ITEM	DESCRIPTION

3. Meter Bar

Provides graphical display of current AM Modulation Meter reading in Radians.

Pressing ZOOM Soft Function Key F1 while cursor is at SINAD/Distortion/Modulation Meter Label (1) accesses full screen Phase Modulation Meter. Available features and editable fields are listed below:



8717047

ITEM	DESCRIPTION

4. RF

Displays selected RF Receiver Frequency. Selections range from .250 to 1000 MHz.

5. Source

Displays MOD METERS as active source. Field is for display only.

6. Range

Displays selected Phase Modulation Meter Upper Range. Selections include Autorange, 1 , 2 , 5 and 10 Radians.

Soft Function Keys available with this function include:

F1 1 RAD
Selects 1 Radian as active upper range for Phase Moduation Meter.

F2 2 RAD
Selects 2 Radians as active upper range for Phase Modulation Meter.

F3 5 RAD
Selects 5 Radians as active upper range for Phase Modulation Meter.

F3 10 RAD
Selects 10 Radians as active upper range for Phase Modulation Meter.

F5 AUTO
Selects Autorange as active upper range for Phase Modulation Meter. This setting automatically adjusts to higher or lower upper range if signal increases or decreases to specified level of current setting.

F6 RETURN
Returns unit to RF Receive Operation Screen.

7. Peak Hold

Displays current status of Peak Hold function. Displays OFF or ON. When ON, Peak Readings (21) are displayed.

Soft Function Keys available with this function include:

F1 OFF/ON
Toggles Peak Hold Function ON and OFF.

F5 RST PK
Resets Peak Hold Function.

F6 RETURN
Returns Test Set to Normal RF Receiver Operation.

8. AVERAGE

Displays current status of Averaging Function and number of samples when active. Status is OFF or ON. Averaging Function averages selected number of readings and reports average as Digital Readout (20). Range is 2 to 10.

Soft Function Keys available with this function include:

F1 OFF/ON
Toggles Average Function ON and OFF.

F5 RST PK
Resets Peak Hold Function.

F6 RETURN
Returns Test Set to Normal RF Receiver Operation.

9. Upper Limit

Displays current status of Upper Limit Function and Upper Limit value when active. Status is OFF or ON. Range is 0 to 99.99 Radians; however, only 0 to 10 Radians is valid. When ON, Upper Limit Bar (17) is displayed.

Soft Function Keys available with this function include:

F1 OFF/ON
Toggles Upper Limit Function ON and OFF.

F5 RST PK
Resets Peak Hold Function.

F6 RETURN
Returns Test Set to Normal RF Receiver Operation.

10. Lower Limit

Displays current status of Lower Limit Function and Lower Limit value when active. Status is OFF or ON. Range is 0 to 99.99 Radians; however, only 0 to 10 Radians is valid. When ON, Lower Limit Bar (19) is displayed.

Soft Function Keys available with this function include:

F1 OFF/ON
Toggles Lower Limit Function ON and OFF.

F5 RST PK
Resets Peak Hold Function.

F6 RETURN
Returns Test Set to Normal RF Receiver Operation.

11. Alarm

Displays current status of Alarm Function. Status is OFF or ON. When ON, Audible alarm sounds when signal exceeds Upper Limit (9) or is below Lower Limit (10).

Soft Function Keys available with this function include:

F1 OFF/ON
Toggles Alarm Function ON and OFF.

F5 RST PK
Resets Peak Hold Function.

F6 RETURN
Returns Test Set to Normal RF Receiver Operation.

ITEM	DESCRIPTION

12. High-Pass Filter (HPF)

    Displays current High-Pass Filter setting for Phase Modulation Meter.

13. Low-Pass Filter (LPF)

    Displays current Low-Pass Filter setting for Phase Modulation Meter.

14. Bandpass Filter (BPF)

    Displays current Bandpass Filter setting for Phase Modulation Meter.

15. IF Bandwidth

    Displays selected IF Bandwidth. Selections include 15 and 300 kHz.

    Soft Function Keys available with this field include:

    F1 300 kHz
    Selects 300 kHz bandpass filter as active filter.

    F2 15 kHz
    Selects 15 kHz bandpass filter as active filter.

16. Upper Range Limit Readout

    Displays current value of Range (6). Redefined as needed if Autorange function is active.

17. Upper Limit Bar

    Indicates position of Upper Limit (9) on Bar Meter (18). If Upper Limit (9) exceeds RANGE (6), marker is not visible.

18. Bar Meter

    Relative Graphic display of current Phase Modulation Meter reading.

19. Lower Limit Bar

    Indicates position of Lower Limit (10) on Bar Meter (18). If Lower Limit (10) exceeds Range (6), marker is not visible.

20. Digital Readout

    Displays current Phase Modulation Meter Reading.

21. Peak Readings

    Displays current high and low Peak readings when Peak Hold (7) is set to ON. Readings are reinitialized when RST PK Soft Function Key F5 is pressed.

ITEM	DESCRIPTION

22. SCOPE/ANALYZER Screen

Displays digitized trace of specified signal as Oscilloscope or Spectrum Analyzer.

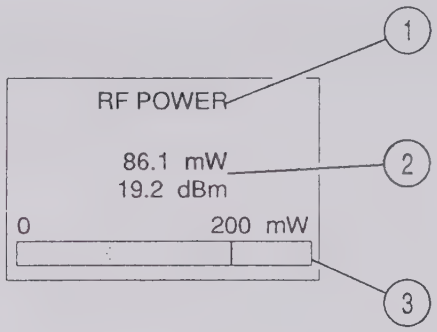
23. SCOPE/ANALYZER Prompt

Displays current operation function. Used to toggle between two functions. Refer to para 3-3-2(M) for information on RF Receiver Oscilloscope Operation and para 3-3-2(N) for information on RF Receiver Spectrum Analyzer Operation.

I. RF POWER METER

The RF Power Meter for the RF Receive Operation Screen measures RF Power for signals received at the T/R Connector. The Power Meter is visible as a miniature meter on the RF Receive Operation Screen or as full screen meter.

Information provided from the RF Receive Operation Screen is displayed as follows:



8717059

ITEM	DESCRIPTION

1. RF Power Meter/Received Level Meter Label

   Displays label for selected Meter Operation. Displays RF Power if T/R Connector is used for input. Displays REC LEVEL (Received Level) if ANTENNA Connector is used for input.

   Soft Function Keys available with this field include:

   F1 ZOOM
   Expands current meter into full-size meter.

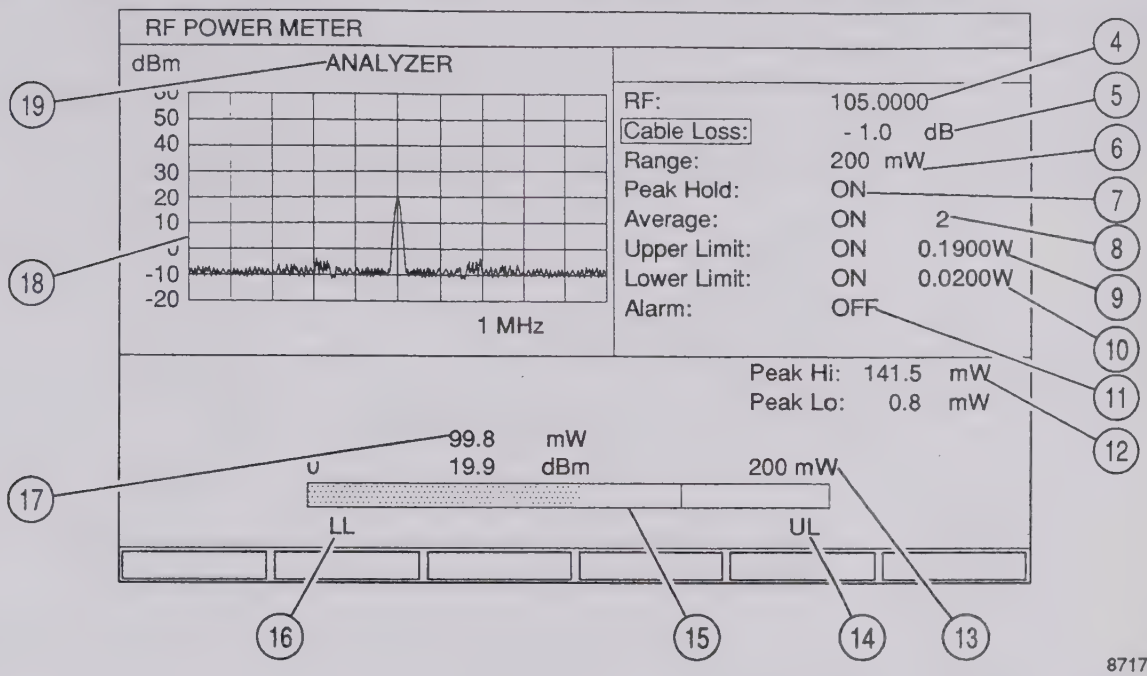
2. Meter Reading

   Displays current RF Power Reading in mW or W and dBm.

3. Meter Bar

   Provides graphical display of current RF Power Meter reading in mW or W.

Pressing ZOOM Soft Function Key F1 when cursor is at RF Power Meter/Received Level Meter Label (1) accesses full screen RF Power Meter. Available features are as follows:



8717009

ITEM	DESCRIPTION

4. RF

Displays RF Receiver Frequency. Selections range from .2500 to 1000 MHz.

5. Cable Loss

Displays selected gain or attenuation offset for Digital Readout (17). Gain is uses positive values and attenuation uses negative values. Range is -99.9 to 99.9 dB.

F3 RE-ZERO
Sets RF Power Meter to 0 mW referenced to current input at T/R Connector.

F5 RST PK
Resets Peak Hold Function.

F6 RETURN
Returns Test Set to Normal RF Receiver Operation.

6. Range

Displays Meter Upper Range. Selections include Autorange and following:

2 mW	5 mW	10 mW	20 mW
50 mW	100 mW	200 mW	500 mW
1 W	2 W	5 W	10 W
20 W	50 W	100 W	200W

Soft Function Keys available with this function include:

F1 MENU
Displays selections for RF Power Meter Range.

F6 RETURN
Returns Test Set to Normal RF Receiver Operation.

F3 RE-ZERO
Sets RF Power Meter to 0 mW referenced to current input at T/R Connector.

F5 RST PK
Resets Peak Hold Function.

F6 RETURN
Returns Test Set to Normal RF Receiver Operation.

7. Peak Hold

Displays status of Peak Hold function. Displays OFF or ON. When ON, Peak Readings (17) are displayed.

Soft Function Keys available with this function include:

F1 OFF/ON
Toggles Peak Hold Function ON and OFF.

F3 RE-ZERO
Sets RF Power Meter to 0 mW referenced to current input at T/R Connector.

F5 RST PK
Resets Peak Hold Function.

F6 RETURN
Returns Test Set to Normal RF Receiver Operation.

8. Average

Displays status of Averaging Function and number of samples when active. Status is OFF or ON. Averaging Function averages selected number of readings and reports average as Digital Readout (20). Range is 2 to 10.

Soft Function Keys available with this function include:

F1 OFF/ON
Toggles Average Function ON and OFF.

F3 RE-ZERO
Sets RF Power Meter to 0 mW referenced to current input at T/R Connector.

F5 RST PK
Resets Peak Hold Function.

F6 RETURN
Returns Test Set to Normal RF Receiver Operation.

9. Upper Limit

Displays status of Upper Limit Function and Upper Limit value when active. Status is OFF or ON. Range is 0 to 200 W. When ON, Upper Limit Bar (14) is displayed.

Soft Function Keys available with this function include:

F1 OFF/ON
Toggles Upper Limit Function ON and OFF.

F3 RE-ZERO
Sets RF Power Meter to 0 mW referenced to current input at T/R Connector.

F5 RST PK
Resets Peak Hold Function.

F6 RETURN
Returns Test Set to Normal RF Receiver Operation.

10. Lower Limit

Displays status of Lower Limit Function and Lower Limit value when active. Status is OFF or ON. Range is 0 to 200 W. When ON, Lower Limit Bar (16) is displayed.

Soft Function Keys available with this function include:

F1 OFF/ON
Toggles Lower Limit Function ON and OFF.

F3 RE-ZERO
Sets RF Power Meter to 0 mW referenced to current input at T/R Connector.

F5 RST PK
Resets Peak Hold Function.

F6 RETURN
Returns Test Set to Normal RF Receiver Operation.

11. Alarm

Displays current status of Alarm Function. Status is OFF or ON. When ON, Alarm sounds when signal exceeds Upper Limit (9) or is below Lower Limit (10).

Soft Function Keys available with this function include:

F1 OFF/ON
Toggles Alarm Function ON and OFF.

F3 RE-ZERO
Sets RF Power Meter to 0 mW referenced to current input at T/R Connector.

F5 RST PK
Resets Peak Hold Function.

F6 RETURN
Returns Test Set to Normal RF Receiver Operation.

12. Peak Readings

Displays current high and low Peak readings when Peak Hold (7) is set to ON. Readings are reinitialized when RST PK Soft Function Key F5 is pressed.

13. Upper Range Limit Readout

Displays value of Range (6). Redefined as needed if Autorange function is active.

14. Upper Limit Bar

Indicates position of Upper Limit (9) on Bar Meter (15). If Upper Limit (9) exceeds Range (6), marker is not visible.

15. Bar Meter

Relative Graphic display of current Phase Modulation Meter reading.

16. Lower Limit Bar

Indicates position of Lower Limit (10) on Bar Meter (15). If Lower Limit (10) exceeds Range (6), marker is not visible.

17. Digital Readout

Displays current RF Power Meter Reading in mW or W and dBm.

18. SCOPE/ANALYZER Screen

Displays digitized trace of specified signal as Oscilloscope or Spectrum Analyzer.

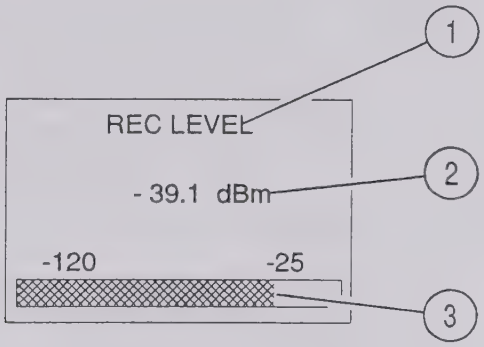
19. SCOPE/ANALYZER PROMPT

Displays current operation function. Used to toggle between two functions. Refer to para 3-3-2(M) for information on RF Receiver Oscilloscope Operation and para 3-3-2(N) for information on RF Receiver Spectrum Analyzer Operation.

J. RECEIVED LEVEL METER

The Received Level Meter for the RF Receive Operation Screen measures referenced RF Power for signals received at the ANTENNA Connector. The Received Level Meter is visible as a miniature meter on the RF Receive Operation Screen or as full screen meter.

Information provided from the the RF Receive Operation Screen is displayed as follows:



8717053

ITEM	DESCRIPTION

1. RF Power Meter/Received Level Meter Label

   Displays label for selected Meter Operation. Displays RF Power if T/R Connector is used for input. Displays REC LEVEL (Received Level) if ANTENNA Connector is used for input.

   Soft Function Keys available with this field include:

   F1 ZOOM
   Expands current meter into full-size meter.

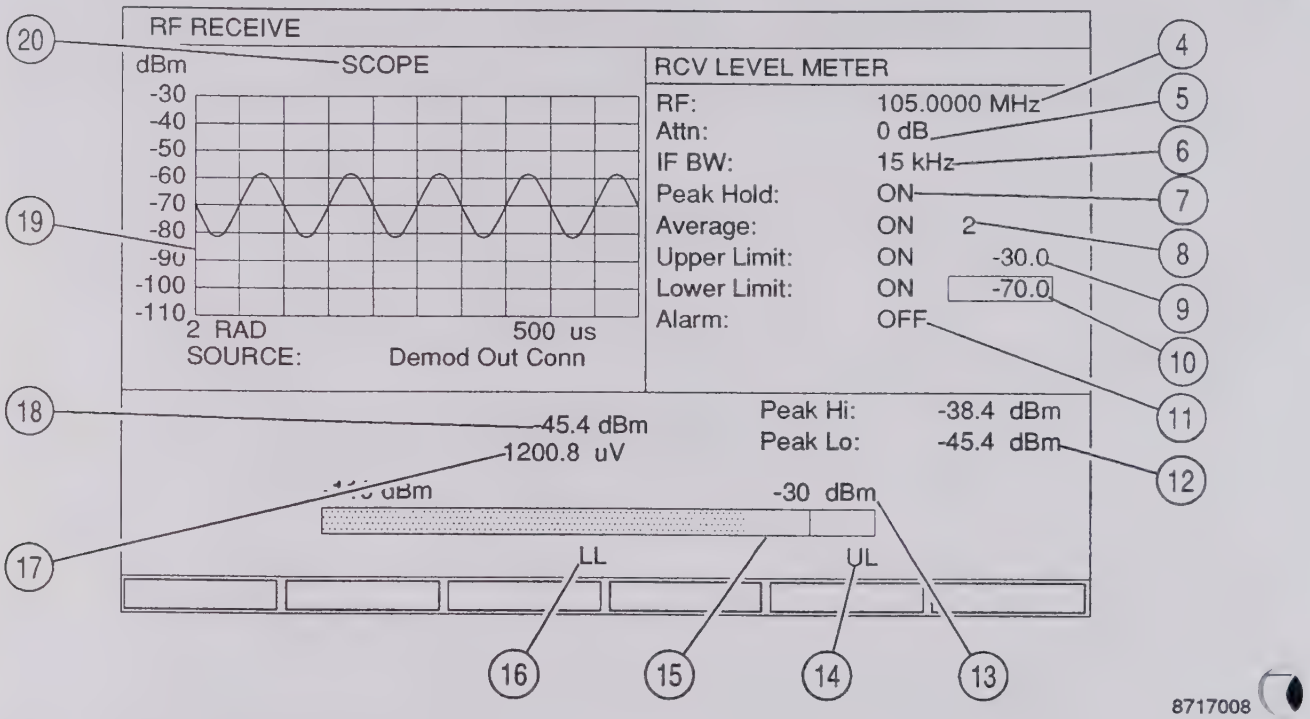
2. Meter Reading

   Displays current Received Level Meter Reading in µV and dBm.

3. Meter Bar

   Provides graphical display of current Received Level Meter reading in µV or dBm.

Pressing ZOOM Soft Function Key F1 when cursor is at RF Power Meter/Received Level Meter Label (1) accesses full screen Received Level Meter. Available features and editable fields are listed as follows:



ITEM	DESCRIPTION

4. RF

Displays selected RF Receiver Frequency. Selections range from .2500 to 1000 MHz.

5. Attenuation

Displays selected attenuation of input signal in dB. Displays either 0 or 30. Attenuation setting affects range of Bar Meter (15). Bar Meter (15) displays range of -110 to -30 dBm when Attenuation of 0 dB is selected. Bar Meter (15) displays range of -80 to 0 dBm when Attenuation of 30 dB is selected.

Soft Function Keys available with this field include:

F1 30 dB
Selects 30 dB Attenuation.

F2 0 dB
Selects 0 dB Attenuation.

6. IF Bandwidth

Displays selected IF Bandwidth. Selections include 15 and 300 kHz.

Soft Function Keys available with this field include:

F1 300 kHz
Selects 300 kHz bandpass filter as active filter.

F2 15 kHz
Selects 15 kHz bandpass filter as active filter.

7. Peak Hold

Displays current status of Peak Hold function. Displays OFF or ON. When ON, Peak Readings (12) are displayed.

Soft Function Keys available with this function include:

F1 OFF/ON
Toggles Peak Hold Function ON and OFF.

F3 SET LVL
Accesses procedure for setting reference for measuring input level at current frequency.

F5 RST PK
Resets Peak Hold Function.

F6 RETURN
Returns Test Set to Normal RF Receiver Operation.

8. Average

Displays current status of Averaging Function and number of samples when active. Status is OFF or ON. Averaging Function averages selected number of readings and reports average as Digital Readout (18). Range is 2 to 10.

Soft Function Keys available with this function include:

F1 OFF/ON
Toggles Average Function ON and OFF.

F3 SET LVL
Accesses procedure for setting reference for measuring input level at current frequency.

F5 RST PK
Resets Peak Hold Function.

F6 RETURN
Returns Test Set to Normal RF Receiver Operation.

9. Upper Limit

Displays status of Upper Limit Function and Upper Limit value when active. Status is OFF or ON. Ranges are -80 to 0 dBm with Attenuation (5) set to 30 dB and -130 to -30 dBm with Attenuation (5) set to 0 dB. When ON, Upper Limit Bar (14) is displayed.

Soft Function Keys available with this function include:

F1 OFF/ON
Toggles Upper Limit Function ON and OFF.

F3 SET LVL
Accesses procedure for setting reference for measuring input level at current frequency.

F5 RST PK
Resets Peak Hold Function.

F6 RETURN
Returns Test Set to Normal RF Receiver Operation.

10. Lower Limit

Displays status of Lower Limit Function and Lower Limit value when active. Status is OFF or ON. Ranges are -80 to 0 dBm with Attenuation (5) set to 30 dB and -130 to -30 dBm with Attenuation (5) set to 0 dB. When ON, Lower Limit Bar (16) is displayed.

Soft Function Keys available with this function include:

F1 OFF/ON
Toggles Average Function ON and OFF.

F3 SET LVL
Accesses procedure for setting reference for measuring input level at current frequency.

F5 RST PK
Resets Peak Hold Function.

F6 RETURN
Returns Test Set to Normal RF Receiver Operation.

11. Alarm

Displays status of Alarm Function. Status is OFF or ON. When ON, Audible alarm sounds when signal exceeds Upper Limit (9) or is below Lower Limit (10).

Soft Function Keys available with this function include:

F1 OFF/ON
Toggles Alarm Function ON and OFF.

F3 SET LVL
Accesses procedure for setting reference for measuring input level at current frequency.

F5 RST PK
Resets Peak Hold Function.

F6 RETURN
Returns Test Set to Normal RF Receiver Operation.

12. Peak Readings

Displays current high and low Peak readings when Peak Hold (7) is set to ON. Readings are reinitialized whenever RST PK Soft Function Key F5 is pressed.

13. Upper Range Limit Readout

Displays current value of Upper Limit. Value depends on Attenuation (5). With Attenuation (5) set to 30 dB, displays 0 dBm. With Attenuation (5) set to 0 dB, displays -30 dBm.

14. Upper Limit Bar

Indicates position of Upper Limit (9) on Bar Meter (15).

15. Bar Meter

Relative Graphic display of current Meter reading.

16. Lower Limit Bar

Indicates position of Lower Limit (10) on Bar Meter (15).

17. Digital Readout (μV)

Displays current Received Level Meter Reading in μV.

18. Digital Readout (dBm)

Displays current Received Level Meter Reading in dBm.

19. SCOPE/ANALYZER Screen

Displays digitized trace of specified signal as Oscilloscope or Spectrum Analyzer.

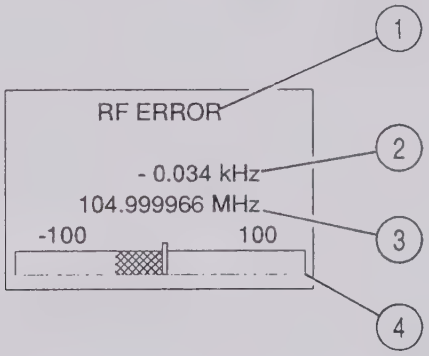
20. SCOPE/ANALYZER Prompt

Displays current operation function. Used to toggle between two functions. Refer to para 3-3-2(M) for information on RF Receiver Oscilloscope Operation and para 3-3-2(N) for information on RF Receiver Spectrum Analyzer Operation.

K. RF FREQUENCY ERROR METER

The RF Frequency Error Meter for the RF Receive Operation Screen measures the Frequency of the received signal and reports the received frequency and the difference in frequency between the received signal and the RF for the RF Receive Operation Screen. The RF Frequency Error Meter is visible as a miniature meter on the RF Receive Operation Screen or as full screen meter.

Information provided on the RF Receive Operation Screen is displayed as follows:



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1. RF Frequency Error Meter Label

   Displays label for selected Meter Operation.

   Soft Function Keys available with this field include:

   F1 ZOOM
   Expands current meter into full-size meter.

2. Error Reading

   Displays current Frequency Error of transmitter in kHz. Frequency Error is difference between the transmitted frequency and the frequency for which COM-120A is set to receive. Frequency Error is positive or negative value.

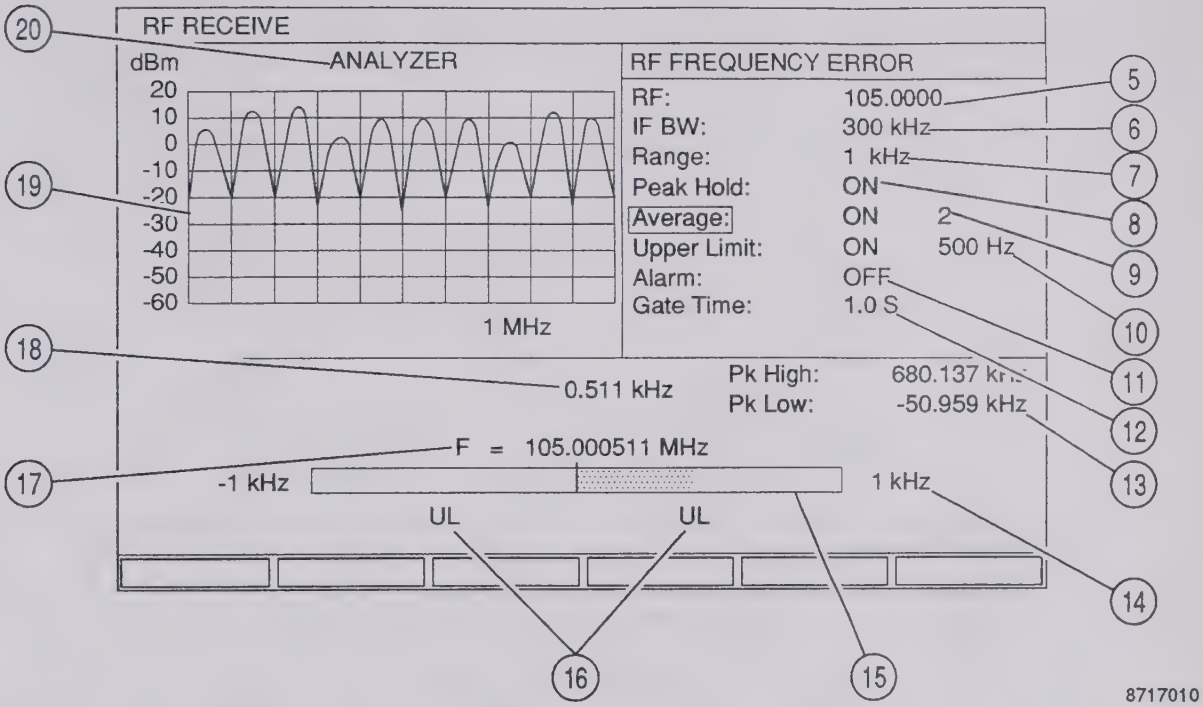
3. Frequency Reading

   Displays current Frequency of received signal in MHz.

4. Meter Bar

   Provides graphical display of current Error Reading in kHz. Positive or negative valueis displayed.

Pressing ZOOM Soft Function Key F1 when cursor is at RF Frequency Error Meter Label (1) accesses full screen RF Frequency Error Meter. Available features and editable fields are as follows:



ITEM	DESCRIPTION

5. RF

Displays selected RF Receiver Frequency. Selections range from .2500 to 1000 MHz.

6. IF Bandwidth

Displays selected IF Bandwidth. Selections include 15 and 300 kHz.

Soft Function Keys available with this field include:

F1 300 kHz
Selects 300 kHz bandpass filter as active filter.

F2 15 kHz
Selects 15 kHz bandpass filter as active filter.

7. Range

Displays selected RF Frequency Error Meter Upper Range. Selections include Autorange, 100 Hz, 1 kHz, 10 kHz and 100 kHz.

Soft Function Keys available with this function include:

F1 100 Hz
Selects 100 Hz Range.

F2 1 kHz
Selects 1 kHz Range.

F3 10 kHz
Selects 10 kHz Range.

F4 100 kHz
Selects 100 kHz Range.

F5 AUTO
Selects Autorange.

F6 RETURN
Returns Test Set to Normal RF Receiver Operation.

8. Peak Hold

Displays current status of Peak Hold function. Displays OFF or ON. When ON, Peak Readings (13) are displayed.

Soft Function Keys available with this function include:

F1 OFF/ON
Toggles Peak Hold Function ON and OFF.

F5 RST PK
Resets Peak Hold Function.

F6 RETURN
Returns Test Set to Normal RF Receiver Operation.

9. Average

Displays current status of Averaging Function and number of samples when active. Status is OFF or ON. Averaging Function averages selected number of readings and reports average as Digital Readout (17). Range is 2 to 10.

Soft Function Keys available with this function include:

F1 OFF/ON
Toggles Average Function ON and OFF.

F5 RST PK
Resets Peak Hold Function.

F6 RETURN
Returns Test Set to Normal RF Receiver Operation.

ITEM	DESCRIPTION

10. Upper Limit

Displays current status of Upper Limit Function and Upper Limit value when active. Status is OFF or ON. Range is 0 to 99999 Hz. When ON, Upper Limit Bars (16) are displayed for below and above RF (5).

Soft Function Keys available with this function include:

F1 OFF/ON
Toggles Upper Limit Function ON and OFF.

F5 RST PK
Resets Peak Hold Function.

F6 RETURN
Returns Test Set to Normal RF Receiver Operation.

11. Alarm

Displays current status of Alarm Function. Status is OFF or ON. When ON, Audible alarm sounds when signal exceeds Upper Limit (10).

Soft Function Keys available with this function include:

F1 OFF/ON
Toggles Alarm Function ON and OFF.

F5 RST PK
Resets Peak Hold Function.

F6 RETURN
Returns Test Set to Normal RF Receiver Operation.

12. Gate Time

Displays selected Gate Time for acquiring signal frequency. Selections include 0.1 and 1.0 seconds. Selecting 0.1 second Gate Time allows faster acquisition of data and is less accurate than 1.0 second Gate Time.

F1 0.1 S
Selects 0.1 second Gate Time.

F2 1.0 S
Selects 1.0 second Gate Time.

F5 RST PK
Resets Peak Hold Function.

F6 RETURN
Returns Test Set to Normal RF Receiver Operation.

ITEM	DESCRIPTION

13. Peak Readings

    Displays current high and low Peak readings when Peak Hold (8) is set to ON. Readings are reinitialized when RST PK Soft Function Key F5 is pressed.

14. Upper Range Limit Readout

    Displays current value of Range (7). Redefined as needed if Autorange function is active.

15. Bar Meter

    Relative Graphic display of current Meter reading.

16. Upper Limit Bar

    Indicates position of Upper Limit (10) on Bar Meter (15). If Upper Limit (10) exceeds Range (7), marker is not visible.

17. Frequency Reading

    Displays current Frequency of received signal in MHz.

18. Error Reading

    Displays current Frequency Error of transmitter in kHz. Frequency Error is difference between transmitted frequency and frequency for which COM-120A is set to receive. Frequency Error is positive or negative value.

19. SCOPE/ANALYZER Screen

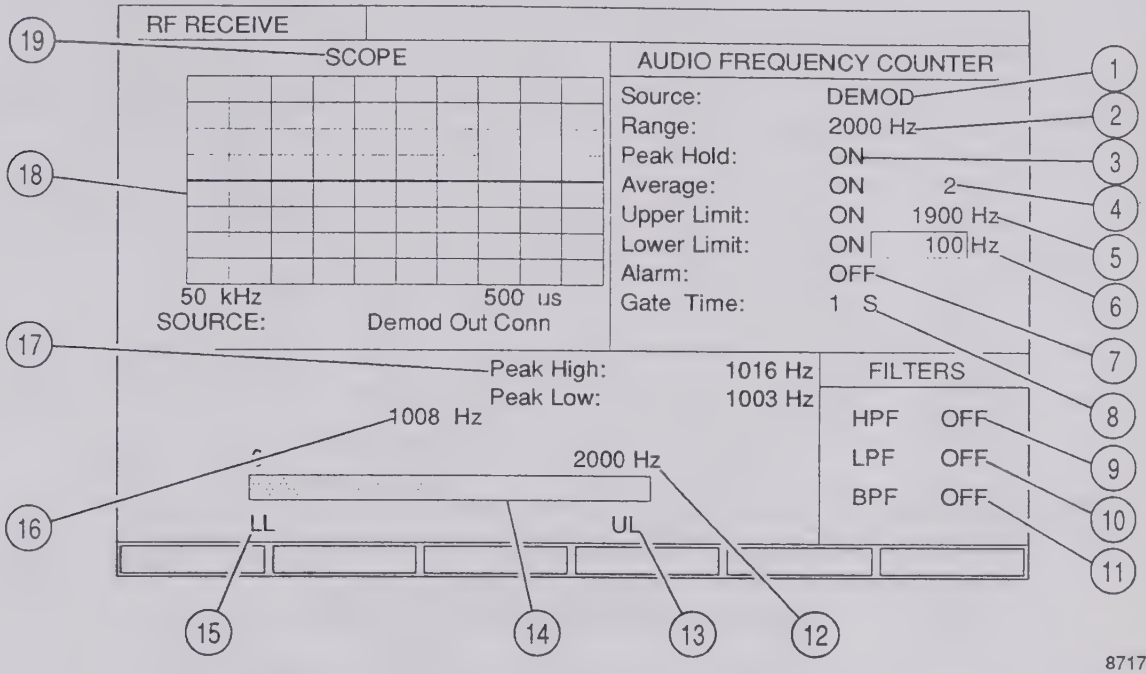
    Displays digitized trace of specified signal as Oscilloscope or Spectrum Analyzer.

20. SCOPE/ANALYZER Prompt

    Displays current operation function. Used to toggle between two functions. Refer to para 3-3-2(M) for information on RF Receiver Oscilloscope Operation and para 3-3-2(N) for information on RF Receiver Spectrum Analyzer Operation.

L. AUDIO FREQUENCY COUNTER

The Audio Frequency Counter for the RF Receive Operation Screen counts the audio signal that is modulating the received RF signal. The Audio Frequency Counter is visible as reading only on the RF Receive Operation Screen or a full screen meter. Information provided from the full meter is displayed below:



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ITEM	DESCRIPTION

1. Source

   Displays DEMOD (Demodulated Signal) as Meter Source. Field is for display only.

2. Range

   Displays selected RF Power Meter Upper Range. Selections include Autorange, 200 Hz, 2000 Hz and 20 kHz.

   Soft Function Keys available with this function include:

   F1 200 Hz
   Selects 200 Hz Range.

   F2 2000 Hz
   Selects 2 kHz Range.

   F3 20 kHz
   Selects 20 kHz Range.

   F4 AUTO
   Selects Autorange.

F5 RST PK
Resets Peak Hold Function.

F6 RETURN
Returns Test Set to Normal RF Receiver Operation.

3. Peak Hold

Displays current status of Peak Hold function. Displays OFF or ON. When ON, Peak Readings (17) are displayed.

Soft Function Keys available with this function include:

F1 OFF/ON
Toggles Peak Hold Function ON and OFF.

F5 RST PK
Resets Peak Hold Function.

F6 RETURN
Returns Test Set to Normal RF Receiver Operation.

4. Average

Displays current status of Averaging Function and number of samples when active. Status is OFF or ON. Averaging Function averages selected number of readings and reports average as Digital Readout (17). Range of samples is 2 to 10.

Soft Function Keys available with this function include:

F1 OFF/ON
Toggles Average Function ON and OFF.

F5 RST PK
Resets Peak Hold Function.

F6 RETURN
Returns Test Set to Normal RF Receiver Operation.

5. Upper Limit

Displays status of Upper Limit Function and Upper Limit value when active. Status is OFF or ON. Range is 0 to 20000 Hz. When ON, Upper Limit Bar (13) is displayed.

Soft Function Keys available with this function include:

F1 OFF/ON
Toggles Upper Limit Function ON and OFF.

F5 RST PK
Resets Peak Hold Function.

F6 RETURN
Returns Test Set to Normal RF Receiver Operation.

6. Lower Limit

Displays status of Lower Limit Function and Lower Limit value when active. Status is OFF or ON. Range is 0 to 20000 Hz. When ON, Lower Limit Bar (16) is displayed.

Soft Function Keys available with this function include:

F1 OFF/ON
Toggles Lower Limit Function ON and OFF.

F5 RST PK
Resets Peak Hold Function.

F6 RETURN
Returns Test Set to Normal RF Receiver Operation.

7. Alarm

Displays current status of Alarm Function. Status is OFF or ON. When ON, Audible alarm sounds when signal exceeds Upper Limit (5) or goes below Lower Limit (6).

Soft Function Keys available with this function include:

F1 OFF/ON
Toggles Alarm Function On and Off.

F5 RST PK
Resets Peak Hold Function.

F6 RETURN
Returns Test Set to Normal RF Receiver Operation.

8. Gate Time

Displays selected Gate Time for acquiring signal frequency. Selections include 1 and 10 seconds. Selecting 1 second Gate Time allows faster acquisition of data but is less accurate than 10 second Gate Time.

F1 1 S
Selects 1 second Gate Time.

F2 10 S
Selects 10 second Gate Time.

F5 RST PK
Resets Peak Hold Function.

F6 RETURN
Returns Test Set to Normal RF Receiver Operation.

9. High-Pass Filter (HPF)

Displays current High-Pass Filter setting for Audio Frequency Counter.

10. Low-Pass Filter (LPF)

Displays current Low-Pass Filter setting for Audio Frequency Counter.

11. Bandpass Filter (BPF)

Displays current Bandpass Filter setting for Audio Frequency Counter.

12. Upper Range Limit Readout

Displays current value of Range (2). Redefined as needed if Autorange function is active.

13. Upper Limit Bar

Indicates position of Upper Limit (5) on Bar Meter (14). If Upper Limit (5) exceeds Range (2), marker is not visible.

14. Bar Meter

Relative Graphic display of current Meter reading.

15. Upper Limit Bar

Indicates position of Lower Limit (6) on Bar Meter (14). If Upper Limit (10) exceeds Range (2), marker is not visible.

16. Frequency Reading

Displays current Audio Frequency of demodulated signal in kHz.

17. Peak Readings

Displays current high and low Peak readings when Peak Hold (8) is set to ON. Readings are reinitialized when RST PK Soft Function Key F5 is pressed.

18. SCOPE/ANALYZER Screen

Displays digitized trace of specified signal as Oscilloscope or Spectrum Analyzer.

19. SCOPE/ANALYZER Prompt

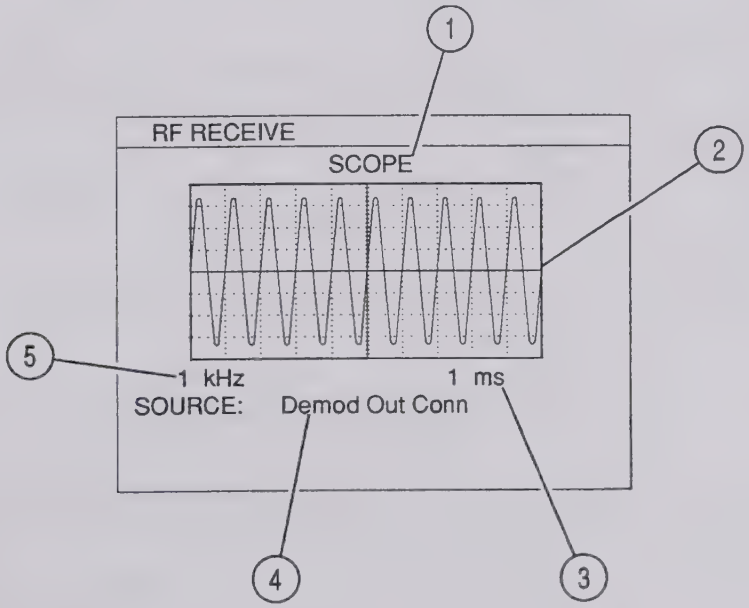
Displays current operation function. Used to toggle between two functions. Refer to 3-3-2(M) for information on RF Receiver Oscilloscope Operation and 3-3-2(N) for information on RF Receiver Spectrum Analyzer Operation.

M. OSCILLOSCOPE OPERATION SCREEN

The abbreviated Oscilloscope, as follows, is visible from the RF Receive Operation Screen and the following full-size Meter Operation Screens:

SINAD Meter Operation Screen (3-3-2[D])
Distortion Meter Operation Screen (3-3-2[E])
FM Deviation Meter Operation Screen (3-3-2[F])
AM Modulation Meter Operation Screen (3-3-2[G])
Phase Modulation Meter Operation Screen (3-3-2[H])
RF Power Meter Operation Screen (3-3-2[I])
Received Level Meter Operation Screen (3-3-2[J])
RF Frequency Error Meter Operation Screen (3-3-2[K])
Audio Frequency Counter Operation Screen (3-3-2[L])

An abbreviated Spectrum Analyzer also can be used in the same position. Information on the Spectrum Analyzer is available in 3-3-2(N). Parameters set on any of the above Operation Screens are reflected in all. Features and parameters of the abbreviated Oscilloscope are as shown:



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ITEM	DESCRIPTION

1. SCOPE/ANALYZER Prompt

   Displays current operation function. Used to toggle between two functions. Refer to 3-3-2(N) for information on RF Receiver Spectrum Analyzer Operation.

   Soft Function Keys are available on RF Receive Operation Screen only:

   F1 ZOOM
   Accesses expanded version of active function.

F2 ANALY/SCOPE
Accesses inactive function. If SCOPE is active, displays ANALY. If ANALYZER is active, displays SCOPE.

2. Oscilloscope Screen

Displays digitized trace of specified signal.

3. Sweep

Displays selected Oscilloscope Sweep. Selections include:

100 µs/Div	200 µs/Div	500µs/Div
1 ms/Div	2 ms/Div	5 ms/Div
10 ms/Div	20 ms/Div	50 ms/Div
100 ms/Div		

Soft Function Keys available with this function include:

F1 MENU
Accesses Menu to set Oscilloscope Sweep. Soft Function Keys available with this function include:

F6 RETURN
Exits Menu into normal operation.

4. SCOPE SOURCE

Displays selected Oscilloscope Source. Selections include:

SOURCE	Signal Input	Signal Type
Scope/DVM-GND	Scope/DVM Connector	External Ground-Coupled Signal
Scope/DVM-AC	Scope/DVM Connector	External AC-Coupled Signal
Scope/DVM-DC	Scope/DVM Connector	External DC-Coupled Signal
AF Cntr	Audio Frequency Counter Signal	Demodulated Signal passed through filters to Audio Frequency Counter.
Notch Residual	Internal Filtered Signal	Notch Filtered Signal passed to SINAD and Distortion Meters. Reading is relative with no units applied.

SOURCE	Signal Input	Signal Type
Audio/Data/Gen Out	Audio/Data GEN Connector	Composite signal of Audio/Data Generators
AF Dec/SINAD	Signal applied to Audio Frequency Decoder, SINAD and Distortion Meters	Demodulated Signal passed through filters to Audio Frequency Decoder, SINAD and Distortion Meters
Data Decoder	Signal applied to Data Decoder	Demodulated Signal passed through filters to Data Decoder
RF Power	RF Power Meter Input	Relative to detected signal applied to RF Power Meter
Detector Out	Demodulated Audio	Unfiltered Demodulated Signal
Demod Out Connector	DEMOD Connector	Filtered Demodulated Signal applied to DEMOD Connector
Mod Meters	Modulation Meters source	Filtered Demodulated Signal applied to selected Modulation Meter.

Soft Function Keys available with this field include:

F1 MENU
Accesses MENU to set active Oscilloscope Source. Soft Function Keys available with this function include:

F6 RETURN
Exits Menu into normal operation without changing Source.

5. Oscilloscope Scale

Displays selected Oscilloscope Vertical Scale. Selections available differ with different SCOPE SOURCE (4). Scales are as follows:

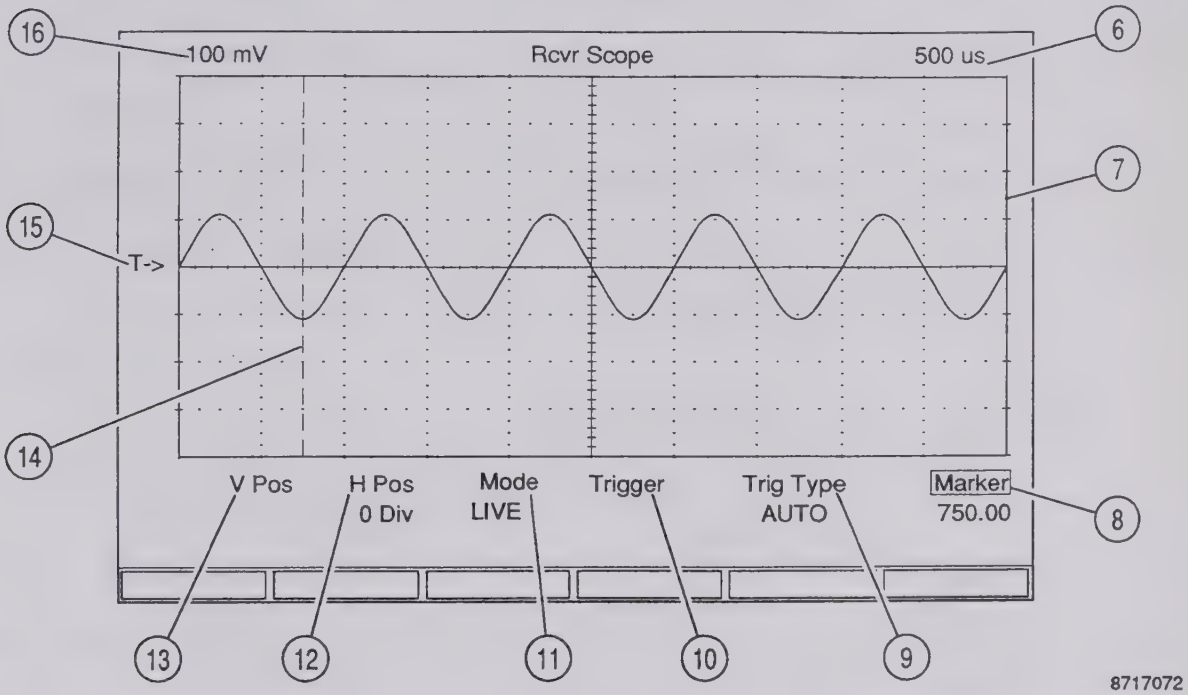
SCOPE SOURCE (4)	Available Scales
Scope/DVM-GND	10, 50, 100, 200, 500 mV/Div 1, 2, 5, 10, 20, 50 V/Div
Scope/DVM-AC	10, 50, 100, 200, 500 mV/Div 1, 2, 5, 10, 20, 50 V/Div
Scope/DVM-DC	10, 50, 100, 200, 500 mV 1, 2, 5, 10, 20, 50 V
AF Cntr	0.02, 0.04, 0.10, 0.20, 0.40, 1.00
Notch Residual	0.02, 0.04, 0.10, 0.20, 0.40, 1.00
Audio/Data/Gen Out	20, 40, 100, 200, 400 mV 1 V
AF Dec/SINAD	FM DEMOD TYPE - 0.1, 0.2, 0.5, 1, 2, 5 kHz AM DEMOD TYPE - 20% PM DEMOD TYPE - 0.1, 0.2, 0.5, 1, 2, 5 Radians
Data Decoder	FM DEMOD TYPE - 0.1, 0.2, 0.5, 1, 2, 5 kHz AM DEMOD TYPE - 20% PM DEMOD TYPE - 0.1, 0.2, 0.5, 1, 2, 5 Radians
RF Power	Low, Med, High (Selection is automatic depending on power provided T/R Connector)
Detector Out	0.1, 0.2, 0.5, 1, 2, 5 kHz
Demod Out Connector	0.02, 0.04, 0.10, 0.20, 0.40, 1.00
Mod Meters	FM DEMOD TYPE - 0.1, 0.2, 0.5, 1, 2, 5 kHz AM DEMOD TYPE - 20% PM DEMOD TYPE - 0.1, 0.2, 0.5, 1, 2, 5 Radians

Soft Function Keys available with this field include:

F1 MENU
Accesses Menu to set Oscilloscope Scale. Selections available are dependent on selected Source (4). Refer to previous table for selections available. Soft Function Keys available with this function include:

F6 RETURN
Exits Menu into normal operation.

Pressing ZOOM Soft Function Key F1 accesses full screen Oscilloscope, when cursor is on SCOPE/ANALYZER Prompt (1). Available features and parameters are as follows:



ITEM	DESCRIPTION

6. Sweep

Displays selected Oscilloscope Sweep. Selections include:

100 µs/Div	200 µs/Div	500µs/Div
1 ms/Div	2 ms/Div	5 ms/Div
10 ms/Div	20 ms/Div	50 ms/Div
100 ms/Div		

Soft Function Keys available with this function include:

F1 MENU
Accesses Menu to set Oscilloscope Sweep.

F6 RETURN
Exits Menu into normal operation.

7. Oscilloscope Screen

Displays digitized trace of specified signal.

8. Marker Position

Displays Marker Position if Marker (14) is active or OFF if inactive. Value for Marker Position is in same units as Sweep (6) with Trigger Level (15) as reference.

Soft Function Keys available with this function include:

F1 On/Off
Toggles Marker (14) between On and Off

9. Trigger Type

Displays Trigger Type. Selections include Auto, One Shot and Normalized.

Soft Function Keys available with this function include:

F1 NORM
Selects Normalized Trigger Type.

F2 AUTO
Selects Auto as Trigger Type.

F3 1 SHOT
Selects One Shot as Trigger Type. Pressing 1 Shot Soft Function Key reenables Trigger.

10. Trigger

Adjusts trigger level as indicated by Trigger Level Indicator (15) when accessed.

11. Mode

Displays Operation Mode. Selections include Live, Compare, Recall, Store and Average.

Soft Function Keys available with this field include:

F2 LIVE
Selects LIVE as Oscilloscope Operation Mode.

F3 AVG
Selects Average as Oscilloscope Operation Mode.

F4 COMPARE
Selects COMPARE as Oscilloscope Operation Mode.

F5 RECALL
Selects RECALL as Oscilloscope Operation Mode.

F6 STORE
Selects STORE as Oscilloscope Operation Mode.

12. H Pos

Displays selected horizontal offset in major divisions. Selections range from -10 to +10 Divisions.

13. V Pos

Accesses vertical position of trace.

14. Marker

User editable Marker controlled using Marker Position (8). Movable through extent of visible screen.

15. Trigger Level Indicator

Indicates approximate Oscilloscope Trigger Level. Editable using Trigger (10).

16. Oscilloscope Scale

Displays Oscilloscope Vertical Scale. Selections available differ with different Source. Scales for each SCOPE SOURCE (4) are as follows:

SCOPE SOURCE (4)	Available Scales
Scope/DVM-GND	10, 50, 100, 200, 500 mV/Div 1, 2, 5, 10, 20, 50 V/Div
Scope/DVM-AC	10, 50, 100, 200, 500 mV/Div 1, 2, 5, 10, 20, 50 V/Div
Scope/DVM-DC	10, 50, 100, 200, 500 mV 1, 2, 5, 10, 20, 50 V
AF Cntr	0.02, 0.04, 0.10, 0.20, 0.40, 1.00
Notch Residual	0.02, 0.04, 0.10, 0.20, 0.40, 1.00
Audio/Data/Gen Out	20, 40, 100, 200, 400 mV 1 V
AF Dec/SINAD	FM DEMOD TYPE - 1, 2, 5, 10, 20, 50 kHz AM DEMOD TYPE - 20% PM DEMOD TYPE - 0.1, 0.2, 0.5, 1, 2, 5 Radians
Data Decoder	FM DEMOD TYPE - 1, 2, 5, 10, 20, 50 kHz AM DEMOD TYPE - 20% PM DEMOD TYPE - 0.1, 0.2, 0.5, 1, 2, 5 Radians
RF Power	Low, Med, High (Selection is automatic depending on power provided T/R Connector)
Detector Out	0.1, 0.2, 0.5, 1, 2, 5 kHz
Demod Out Connector	0.02, 0.04, 0.10, 0.20, 0.40, 1.00
Mod Meters	FM DEMOD TYPE - 1, 2, 5, 10, 20, 50 kHz AM DEMOD TYPE - 20% PM DEMOD TYPE - 0.1, 0.2, 0.5, 1, 2, 5 Radians

Soft Function Keys available with this field include:

F1 MENU
Accesses Menu to set Oscilloscope Scale. Soft Function Keys available with this function include:

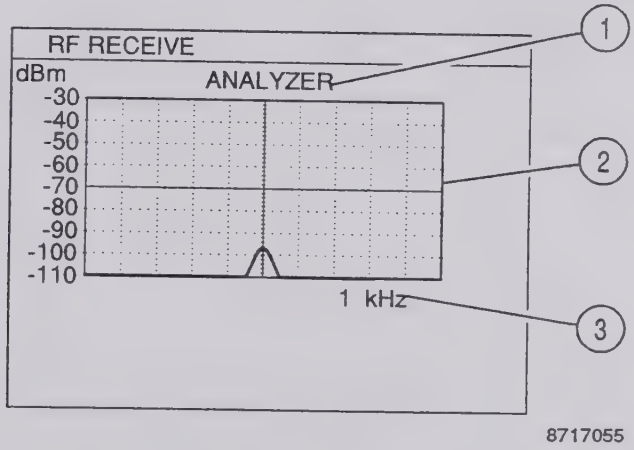
F6 RETURN
Exits Menu into normal operation.

N. SPECTRUM ANALYZER OPERATION SCREEN

The abbreviated Spectrum Analyzer, as follows, is visible from the RF Receive Operation Screen and the following full-size Meter Operation Screens:

SINAD Meter Operation Screen (3-3-2[D])
Distortion Meter Operation Screen (3-3-2[E])
FM Deviation Meter Operation Screen (3-3-2[F])
AM Modulation Meter Operation Screen (3-3-2[G])
Phase Modulation Meter Operation Screen (3-3-2[H])
RF Power Meter Operation Screen (3-3-2[I])
Received Level Meter Operation Screen (3-3-2[J])
RF Frequency Error Meter Operation Screen (3-3-2[K])
Audio Frequency Counter Operation Screen (3-3-2[L])

An abbreviated Oscilloscope also can be used in the same position. Information on the Oscilloscope is available in 3-3-2(M). Parameters set on any of the above Operation Screens are reflected in all. Features and parameters of the abbreviated Spectrum Analyzer are as shown:



ITEM	DESCRIPTION

1. SCOPE/ANALYZER Prompt

   Displays current operation function. Used to toggle between two functions. Refer to 3-3-2(M) for information on RF Receiver Oscilloscope Operation.

   Soft Function Keys available on include:

   F1 ZOOM
   Accesses expanded version of active function.

   F2 ANALY/SCOPE
   Accesses inactive function. If SCOPE is active, displays ANALY. If ANALYZER is active, displays SCOPE.

2. Spectrum Analyzer Screen

   Displays digitized trace of specified signal.

3. Scan Width

   Displays selected Scan Width per division. Selections include zero scan and:

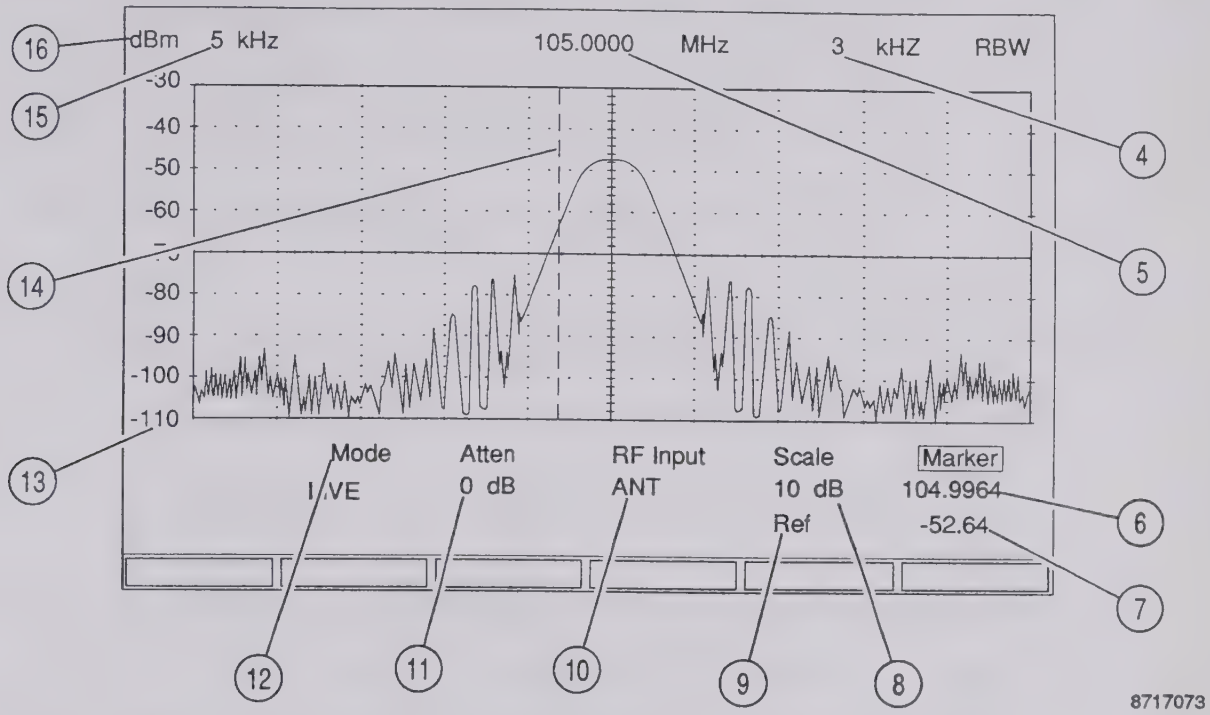
1 kHz/Div	2 kHz/Div	5 kHz/Div
10 kHz/Div	20 kHz/Div	50 kHz/Div
100 kHz/Div	200 kHz/Div	500 kHz/Div
1 MHz		

   Soft Function Keys available on include:

   F1 MENU
   Accesses Menu to set Scan Width. Soft Function Keys available with this function include:

   F6 RETURN
   Exits Menu into normal operation.

Pressing ZOOM Soft Function Key F1 accesses full screen Spectrum Analyzer, when cursor is on SCOPE/ANALYZER Prompt (1) and abbreviated Spectrum Analyzer is displayed. Available features and parameters are described as follows:



ITEM	DESCRIPTION

4. Resolution Bandwidth

   Displays Resolution Bandwidth for Scan Width (15). This field is for display only.

5. Center Frequency

   Displays Center Frequency. Selections range from 0.2500 to 1000.0000 MHz.

   F1 Set Ref
   Adjusts Spectrum Analyzer to referenced level. Function should be initiated when frequency is changed for greatest accuracy.

   F2 Find
   Activates Find Function. Find Function searches for first signal with level exceeding reference set by Find Lvl Soft Function Key F3. Search band is twice Sweep Width, set by Config Soft Function Key F4, centered around Center Frequency.

   F3 Find Lvl
   Activates horizontal marker for setting reference level of Find Function. Marker level is controlled by DATA SCROLL Keys or DATA SCROLL Spinner. Press Soft Key to exit.

F4 Config
Accesses window for setting Sweep Width for Find Function. Range of Sweep Width is 0.2000 to 500.0000 MHz. Press Soft Key to exit.

F5 Split
Accesses Split Screen Function. Split Screen Spectrum Analyzer allows two Center Frequencies for same configuration. Soft Function Keys include:

F1 Normal
Sets Spectrum Analyzer to Normal Center Frequency Operation.

6. Marker Position

Displays current Marker Position if Marker (12) is active or OFF if inactive. Units aresame as Scan Width (13). Referenced to Center Frequency (5).

Soft Function Keys available with this function include:

F1 On/Off
Toggles Marker (12) between On and Off.

7. Marker Level

Displays current Marker Level if Marker (12) is active. Blank if Marker (12) is OFF.

8. Scale

Displays Logarithmic Scale for Vertical Scale (13). Selections are 2 and 10 dB.

F1 10 dB
Selects 10 dB Logarithmic Scale for Spectrum Analyzer Vertical Scale (13).

F2 2 dB
Selects 2 dB Logarithmic Scale for Spectrum Analyzer Vertical Scale (13).

9. Reference

Adjusts Spectrum Analyzer Vertical Scale (13) ±10 dB when Scale (8) is set to 10 dB. When Scale (8) is set to 2 dB, adjusts Spectrum Analyzer Vertical Scale (13) through full range, displaying 16 dB window and incrementing in 1 dB steps.

10. RF Input

Displays selected RF Input Connector. Selections include ANT (ANTENNA Connector) and T/R (T/R Connector).

Soft Function Keys available with this field include:

F1 T/R
Selects T/R Connector as RF Input Connector.

F2 ANT
Selects ANTENNA Connector as RF Input Connector.

11. Atten

Displays Attenuation for RF Input (10). Selections include 0 dB and 30 dB.

Soft Function Keys available with this field include:

F1 0 dB
Selects 0 dB Attenuation for RF Input (10).

F2 30 dB
Selects 30 dB Attenuation for RF Input (10).

12. Mode

Displays selected Operation Mode. Selections include Peak Hold, Live, Compare, Recall, Store, Average and Normalized.

Soft Function Keys available with this field include:

F1 PKHOLD
Selects Peak Hold as Spectrum Analyzer Operation Mode.

F2 LIVE
Selects LIVE as Spectrum Analyzer Operation Mode.

F3 AVG
Selects Average as Spectrum Analyzer Operation Mode.

F4 COMPARE
Selects COMPARE as Spectrum Analyzer Operation Mode.

F5 RECALL
Selects RECALL as Spectrum Analyzer Operation Mode.

F6 STORE
Selects STORE as Spectrum Analyzer Operation Mode.

13. Vertical Scale

Provides scale for Spectrum Analyzer. Position is controlled by Reference (9).

14. Marker

User editable Marker controlled using Marker Position (8).

15. Scan Width

Displays selected Scan Width per division. Selections include zero scan and:

1 kHz/Div	2 kHz/Div	5 kHz/Div
10 kHz/Div	20 kHz/Div	50 kHz/Div
100 kHz/Div	200 kHz/Div	500 kHz/Div
1 MHz		

ITEM DESCRIPTION

16. Logarithmic Function

Displays selected Logarithmic Function for referencing Vertical Scale (13). Selections include dBm, dBµV, dBmV, dBV, dBµW and dBW.

Soft Function Keys available with this field include:

F1 dBm
Selects dBm as Logarithmic Function.

F2 dBµV
Selects dBµV as Logarithmic Function.

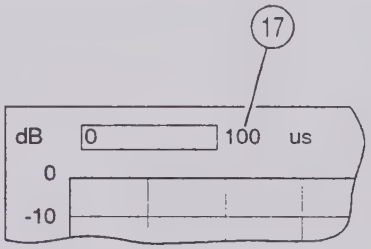
F3 dBmV
Selects dBmV as Logarithmic Function.

F4 dBV
Selects dBV as Logarithmic Function.

F3 dBµW
Selects dBµW as Logarithmic Function.

F4 dBW
Selects dBW as Logarithmic Function.

When Scanwidth (17) is set to Zero Scan the following field becomes active:



8717076

ITEM DESCRIPTION

17. Zero Scan Sweep

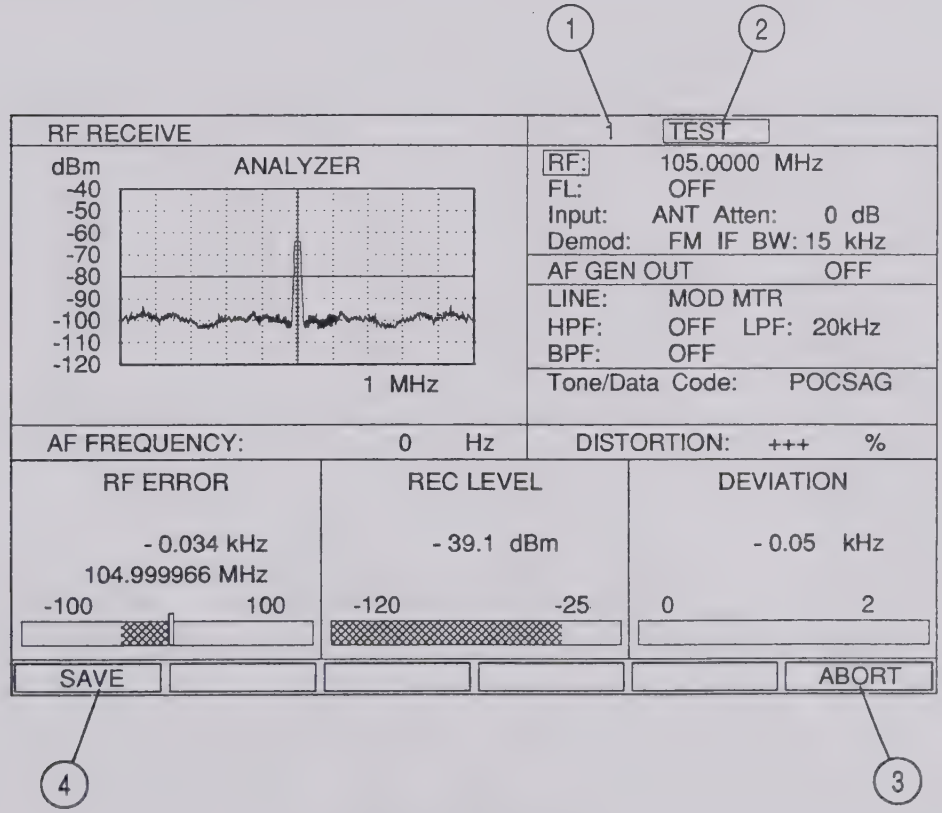
Displays selected Sweep per division when Scan Width (15) is set to Zero Scan. Selections include:

100 µs/Div	200 µs/Div	500µs/Div
1 ms/Div	2 ms/Div	5 ms/Div
10 ms/Div	20 ms/Div	50 ms/Div
100 ms/Div		

O. STORE AND RECALL OPERATION

Pressing STORE Memory Key allows the operator to store up to 50 RF Receive Operation Screen configurations. Storage Locations 0 through 49 can be used to store a RF Generate Operation configuration, a RF Receive Operation configuration or a Duplex Operation configuration (Receive and Generate pair). Refer to 3-3-8(B) for information on the Setup List that displays all Memory Locations, operation types and associated Memory Location Labels (2).

Pressing STORE Memory Key while in RF Receive Operation Screen accesses the following fields:



8717069

ITEM	DESCRIPTION

1. Memory Location

   Displays selected Memory Location for storage of current configuration. Refer to 3-3-8(B) for information on Setup List that displays all Memory Locations, operation types and associated Memory Location Labels (2).

2. Memory Location Label

   Displays optional alphanumeric label for selected Memory Location.

3. SAVE Soft Function Key F1

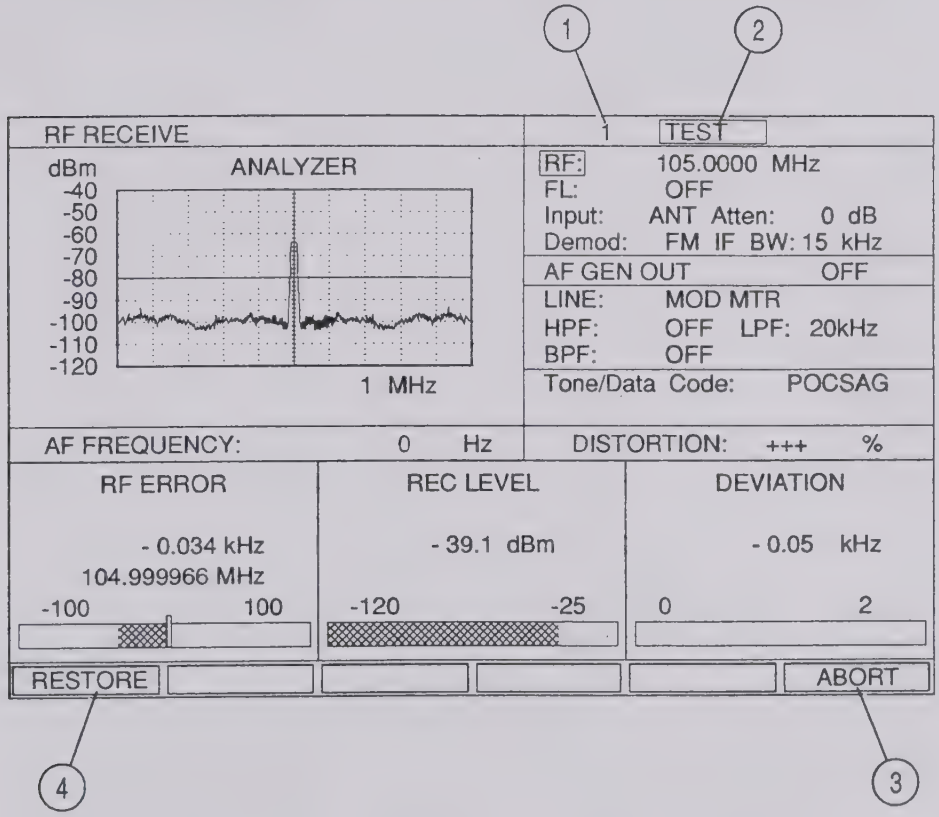
   Finalizes Storage Operation. Save Soft Function Key F1 or Abort Soft Function Key F6 (4) must be pressed to return to normal operation.

4. ABORT Soft Function Key F6

   Escapes Storage Operation without performing any edit. SAVE Soft Function Key F1 (3) or Abort Soft Function Key F6 must be pressed to return to normal operation.

Pressing RCL Memory Key allows the operator to recall up to 50 previously stored operation screens. RF Receive, RF Generate or Dupex Operation Screen configurations and all be accessed from the RF Generate Operation Screen. Accessing anything other than an RF Generate Operation Screen configuration, automatically switches the COM-120A to the selected mode of operation. Refer to 3-3-8(B) for information on the Setup List that displays all Memory Locations, operation types and associated Memory Location Labels (2).

Pressing RCL Memory Key while in RF Receive Operation Screen accesses the following fields:



8717071

ITEM	DESCRIPTION

1. Memory Location

   Displays selected Memory Location for recall of stored configuration. Refer to 3-3-8(B) for information on Setup List that displays all Memory Locations, operation types and associated Memory Location Labels (2).

2. Memory Location Label

   Displays optional alphanumeric label for selected Memory Location.

3. RESTORE Soft Function Key F1

   Finalizes Recall Operation. RESTORE Soft Function Key F1 or Abort Soft Function Key F6 (4) must be pressed to return to normal operation.

4. ABORT Soft Function Key F6

   Escapes Storage Operation without performing any edit. RESTORE Soft Function Key F1 (3) or ABORT Soft Function Key F6 must be pressed to return to normal operation.

3-3-3 DUPLEX OPERATION SCREEN

The Duplex Operation Screen is used to define and activate the COM-120A RF Generator and RF Receiver simultaneously at the same frequency or offset frequencies. The Duplex Operation Screen is accessed by pressing the DPLX Test Mode Key. Once activated, the COM-120A Display shows a screen similar to Figure 3-5. When accessed, the Duplex Operation Screen is setup in the configuration in which it was last used.

Because of the level of detail required to fully describe the Duplex Operation Screen, information is split by function into sections. The first section covers the overall screen and refers the operator to other sections for additional information.

Section	Title	Page
A.	Duplex General Operation Screen	3-152
B.	Duplex Generate General Operation Screen	3-159
C.	Duplex Receive General Operation Screen	3-164
D.	Store and Recall Operation	3-172

A. DUPLEX GENERAL OPERATION SCREEN

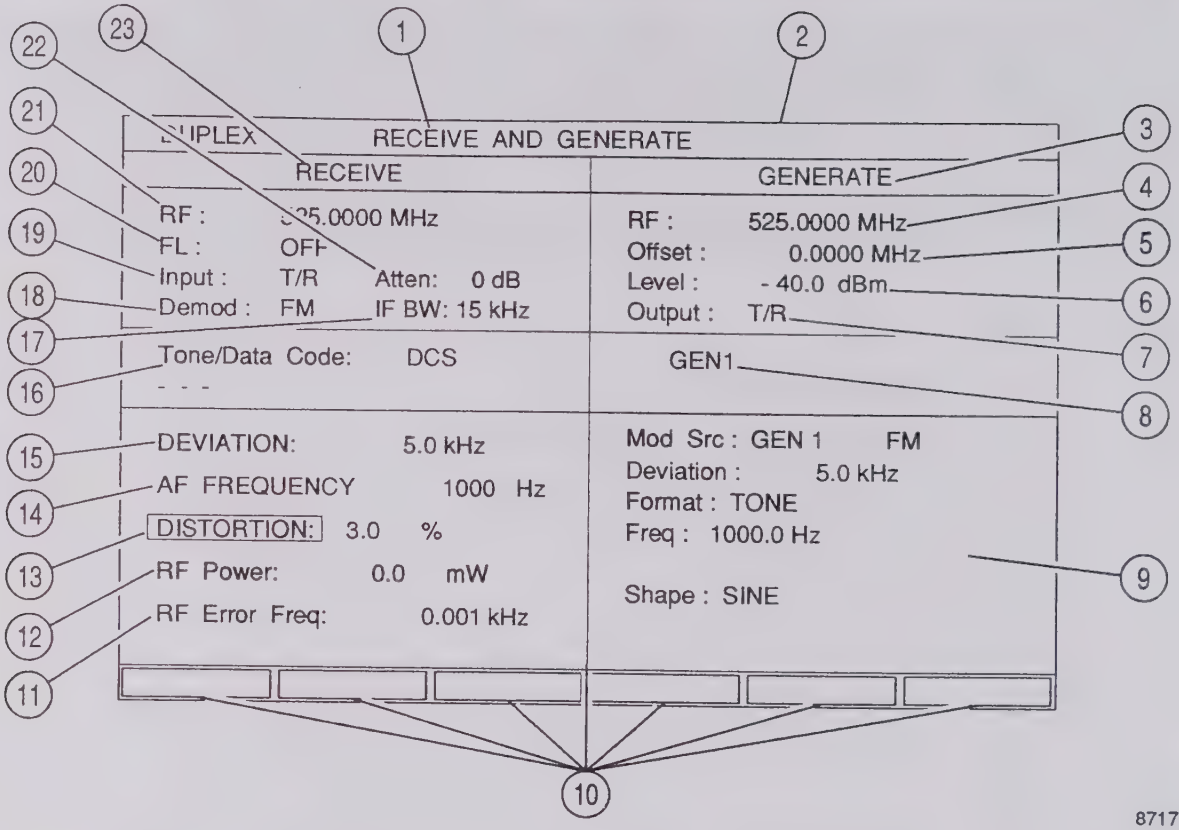


Figure 3-5 Duplex Operation Screen

ITEM	DESCRIPTION

1. Header Bar

   Displays current operation mode.

2. MEMORY Prompt

   If Stored Setup is recalled, displays recalled number (01-99) and Label if used. Blank if RF Generate Operation Screen is in active mode.

3. Duplex Generate Prompt

   Accesses Duplex Generate Operation Screen. Refer to para 3-3-3(B) for information on Duplex Generate Operation Screen.

   Soft Function Keys available include:

   F1 ZOOM
   Accesses Duplex Generate Operation Screen.

4. Duplex Generate RF Field

Displays current Duplex Generate Frequency from 0.2500 to 1000.0000 MHz.

Soft Function Keys available with this field include:

F1 Δ=
Accesses window to set Duplex Generate RF Field change increment. With Δ= active, Soft Function Keys are defined as follows:

F6 RETURN
Closes window and returns to normal operation.

F2 Δ On/Off
Toggles Δ Function OFF and ON. If Δ Function is active,"Δ" is displayed by Frequency Readout.

F3 SET REF
Makes frequency in current Duplex Generate RF Field reference frequency. Duplex Generate RF Field displays offset from reference frequency when activated. If Set Reference Function is active, "R" is displayed.

F5 PAIR/UNPAIR
Toggles PAIR Function ON and OFF. With function active, UNPAIR is displayed for Soft Function Key field and "P" is displayed next to Duplex Generate RF Field. Function ties Duplex Generate RF Field and Duplex Receive RF Field (21) together as Pair with specified Frequency Offset (5). With Pair Function active, editing Duplex Generate RF Field changes Duplex Receive RF Field (21). Editing Frequency Offset (5) or Duplex Receive RF Field (21) changes Duplex Generate RF Field.

5. Frequency Offset

Displays frequency difference between Duplex Generate RF Field (4) and Duplex Receive RF Field (21). Range is from -999.7500 to 999.750 MHz.

F5 PAIR/UNPAIR
Toggles PAIR Function ON and OFF. With function active, UNPAIR is displayed for Soft Function Key field and "P" is displayed next to Duplex Generate RF Field. Function ties Duplex Generate RF Field (4) and Duplex Receive RF Field (21) together as Pair with specified Frequency Offset. With Pair Function active, editing Duplex Generate RF Field (4) changes Duplex Receive RF Field (21). Editing Frequency Offset (5) or Duplex Receive RF Field (21) changes Duplex Generate RF Field.

6. Output Level

Displays Output Level. If T/R Connector is selected for Output (7), range is -130 to -40 dBm, 0 to .002236 V, 0 to 2.2360 mV or 0.07 to 2236.0 μV. If AUX RF Connector is selected for Output (7), range is -130 to -13 dBm, 0 to 0.050059 V, 0 to 50.0593 mV or 0.07 to 50059.3 μV.

Soft Function Keys available with this field include:

F1 dBm
Selects units of dBm for Output Level.

F2 µV
Selects units of µV for Output Level.

F3 mV
Selects units of mV for Output Level.

F4 V
Selects units of mV for Output Level.

7. Output

Displays Output Connector. Displays T/R, T/R Gate, AUX or AUX Gate. Gated Output is active only when microphone, attached to MIC/ACC Connector, is keyed.

Soft Function Keys available with this field include:

F1 T/R
Selects T/R Connector as output connector.

F2 AUX
Selects AUX RF OUT Connector as output connector.

F3 T/R Gate
Selects T/R Connector as output connector. Output is only active when microphone, attached to MIC/ACC Connector, is keyed.

F4 AUX Gate
Selects AUX RF OUT Connector as output connector. Output is only active when microphone, attached to MIC/ACC Connector, is keyed.

8. Modulation Source Window

Displays active Modulation Sources. Inactive Modulation Sources are not shown.

9. Modulation Source Block

Displays selected Modulation Source. Selections include GEN1 (Audio Generator 1), GEN2 (Audio Generator 2), DTMF (DTMF Tone Generator), DATA (DATA Generator), EXT (External Modulation) and MIC (Microphone Modulation). Refer to para 3-3-1(B) for additional information on Modulation Source Blocks.

10. Soft Function Key Definitions

Functions are redefined with each field of the current operation screen.

11. RF Error Frequency

Displays difference in Duplex Receive RF Field (21) and received signal frequency.

12. Power/Received Level Reading

Power Meter displays power level of signal received through T/R Connector in W. RECEIVED LEVEL Meter displays referenced Power Level of signal received through ANTENNA Connectorn in dBm.

13. SINAD/Distortion Reading

Displays selected measurement. Selections include SINAD and Distortion Readings.

Soft Function Keys available with this field include:

F2 SINAD
Selects SINAD Reading as active reading. Not displayed if reading is currently active.

F3 DIST
Selects Distortion Reading as active reading. Not displayed if reading is currently active.

14. AF FREQUENCY Reading

Displays Audio Frequency of demodulated signal.

15. MODULATION Reading

Displays modulation reading in units of selected Demodulation Type (18). With FM selected, Field displays DEVIATION and has reading in units of kHz. With AM selected, Field displays MODULATION and has reading in units of % Modulation. With PM selected, Field displays PHASE and has reading in units of radians.

16. TONE/DATA CODE Field

Displays selected Tone/Data Type and decoded data. Selections for Tone/Data Type available with standard COM-120A include:

DCS	DTMF	USER
DCS INV (DCS Inverted)		

Additional selections are shown but are unusable unless Option 09 or Option 11 is installed. Additional selections available include:

CCIR	CCIRH	CCIRH4
EEA	EIA	NATEL
ZVEI	DZVEI	DDZEI
EURO	5/6 TONE	POGSAG
POCSAG/ (POCSAG Inverted)		

Soft Function Keys available with this field include:

F1 MENU
Displays TONE/DATA Type selections. Soft Function Keys available include:

F6 RETURN
Returns COM-120A to normal Duplex Operation.

F2 DECODE
Activates DECODE Function for specified Audio/Data type. Accesses Tone Decode Screen for Signalling formats, POCSAG Decode Screen for POCSAG Decode Function and initiates decoding function for DCS and DCS Inverted Functions. Refer to para 3-3-2(C) for further information on the decode screens.

Soft Function Keys available with USER selected for TONE/DATA Type include:

F3 CONFIG
Accesses Configuration Window for configuring User Selectable Frequency and Duration for codes 0 through 9 and A through T. With Configuration Window active, Soft Function Keys are defined as follows:

F1 PG UP
Used to scroll up through Configuration Window.

F2 PG DN
Used to scroll down through Configuration Window.

F3 FILL
Fills remainder of selected column with value of current cursor position.

F6 RETURN
Exits Configuration Window into normal RF Receive operation.

17. IF BANDWIDTH

Displays selected IF Bandwidth. Selections include 15 and 300 kHz.

Soft Function Keys available with this field include:

F1 300 kHz
Selects 300 kHz bandpass filter as active filter.

F2 15 kHz
Selects 15 kHz bandpass filter as active filter.

18 Demodulation Type

Displays selected Demodulation Type. Selections include FM, AM or PM.

Soft Function Keys available with this field include:

F1 FM
Selects FM Demodulation.

F2 AM
Selects AM Demodulation.

F3 PM
Selects PM Demodulation.

19. Input Connector

Displays connector selected for input. Displays either T/R or ANT.

Soft Function Keys available with this field include:

F1 T/R
Selects T/R Connector as input connector.

F2 ANT
Selects ANTENNA Connector as input connector.

20. FL (Frequency List) Setting

Displays selected Frequency List number (FL-00 through FL-99) when active and OFF when inactive. Duplex Receive RF Field (21) echoes frequency of selected Frequency List setting. Directly editing Duplex Receive RF Field (21) inactivates FL Setting. Displays optional Frequency List Label if used. Blank if unused. If Frequency List Label is used, can be accessed to scroll through all Frequency List entries with common first three characters.

Soft Function Keys available with this field include:

F1 ON/OFF
Toggles active function ON and OFF.

F2 T-Fwd
Accesses Trunking-Forward Channel List.

F3 T-Rvs
Accesses Trunking-Reverse Channel List.

F4 C-Fwd
Accesses Cellular-Forward Channel List.

F5 C-Rvs
Accesses Cellular-Reverse Channel List.

F6 FL
Accesses User Defined Frequency List. Refer to para 3-3-8(A) for information on editing User Defined Frequency List.

21. Duplex Receive RF Field

Displays current Duplex Receive Frequency from 0.2500 to 1000.0000 MHz.

Soft Function Keys available with this field include:

F1 Δ=
Accesses window to set Duplex Receive RF Field change increment. With Δ= active, Soft Function Keys are defined as follows:

F6 RETURN
Closes window and returns to normal operation.

F2 Δ On/Off
Toggles Δ Function OFF and ON. If Δ Function is active,"Δ" is displayed by Frequency Readout.

F5 PAIR/UNPAIR
Toggles PAIR Function ON and OFF. With function active, UNPAIR is displayed. Function Ties Duplex Generate RF Field (4) and Duplex Receive RF Field together as a Pair with specified Frequency Offset (5). With Pair Function active, editing Duplex Generate RF Field (4) is changes Duplex Receive RF Field . Editing Frequency Offset (5) or Duplex Receive RF Field is changes Duplex Generate RF Field (4).

22. Attenuation

Displays selected attenuation of input signal. Displays either 0 or 30.

Soft Function Keys available with this field include:

F1 30 dB
Selects 30 dB Attenuation.

F2 0 dB
Selects 0 dB Attenuation.

23. Duplex Receive Prompt

Accesses Duplex Receive Operation Screen. Refer to para 3-3-3(C) for additional information on Duplex Receive Operation Screen.

Soft Function Keys available include:

F1 ZOOM
Accesses Duplex Receive Operation Screen.

C. DUPLEX GENERATE GENERAL OPERATION SCREEN

The Duplex Generate Operation Screen is used to define and activate the COM-120A RF Generator for Duplex Operation. The Duplex Generate Operation Screen is accessed by pressing ZOOM Soft Function Key F1 when cursor is on the Duplex Generate Prompt on the Duplex Operation Screen or by pressing ENTER Key while cursor is on the Duplex Generate Prompt on the Duplex Operation Screen. Once activated, the COM-120A Display shows a screen similar to Figure 3-6.

Because of the level of detail required to fully describe the Duplex Generate Operation Screen, the operator is referred to other sections in the book for additional detail where required. These sections are contained in para 3-3-1, which covers the RF Generate Operation Screen. The information provided is the same for Duplex or Simplex Generate Operation.

Features and editable parameters on the Duplex Generate Operation Screen are listed as follows:

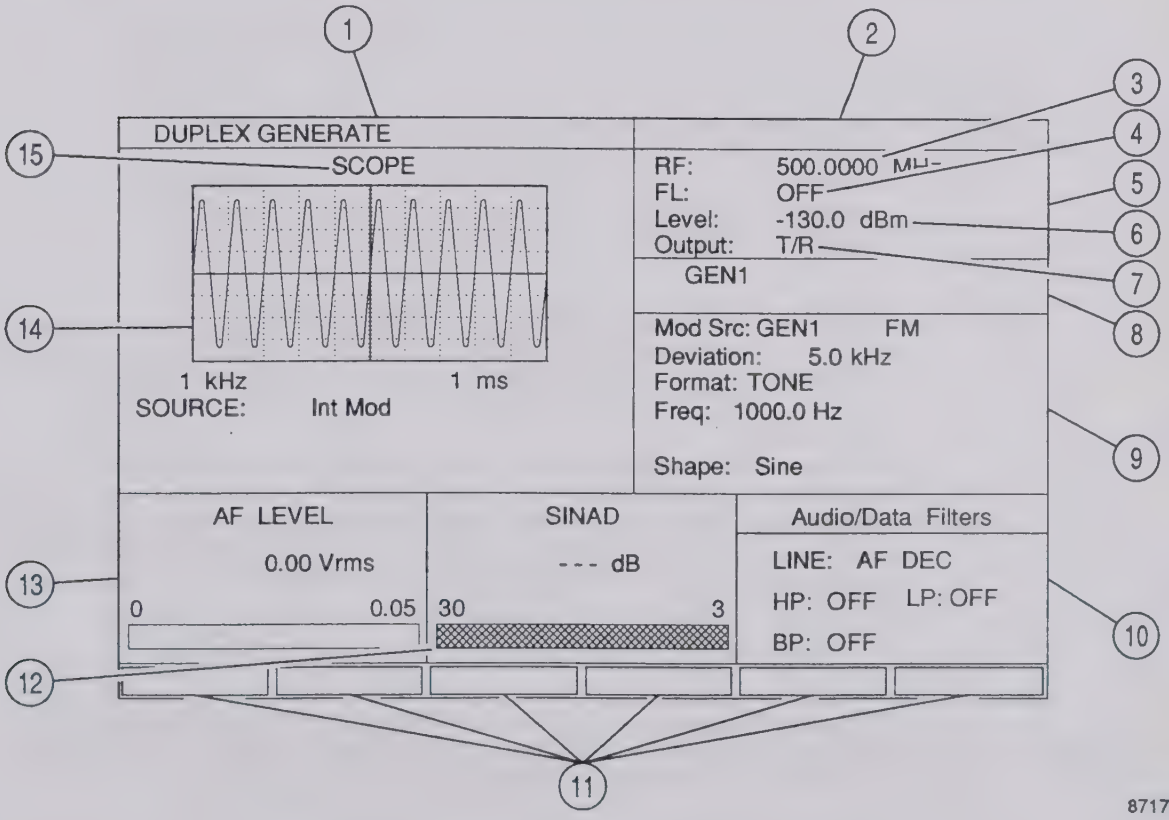


Figure 3-6 Duplex Generate Operation Screen

ITEM	DESCRIPTION

1. Header Bar

   Displays current operation mode.

2. MEMORY Prompt

   If Stored Setup is recalled, displays recalled number (01-49) and Label if used. Blank if Duplex Generate Operation Screen is in active mode.

3. RF Field

   Displays current Duplex Generate Frequency from 0.2500 to 1000.0000 MHz.

   Soft Function Keys available with this field include:

   F1 Δ=
   Accesses window to set Duplex Generate RF Field change increment. With Δ= active, Soft Function Keys are defined as follows:

   F6 RETURN
   Closes window and returns to normal operation.

   F2 Δ On/Off
   Toggles Δ Function OFF and ON. If Δ Function is active,"Δ" is displayed by Frequency Readout.

   F3 SET REF
   Makes frequency in current Duplex Generate RF Field reference frequency. Duplex Generate RF Field displays offset from reference frequency when activated. If Set Reference Function is active, "R" is displayed.

   F5 PAIR/UNPAIR
   Toggles PAIR Function ON and OFF. With function active, UNPAIR is displayed for Soft Function Key field and "P" is displayed next to RF Field. Function ties Duplex Generate RF Field and Duplex Receive Frequency together as Pair with specified Frequency Offset. With Pair Function active, editing Duplex Generate RF Field changes Duplex Receive Frequency.

4. FL (Frequency List) Setting

   Displays selected Frequency List number (FL-00 to FL-99) when active. Blank if inactive. RF Field (3) echoes frequency of selected Frequency List setting. Editing RF Field (3) deactivates Frequency List Function.

   Soft Function Keys available with this field include:

   F1 ON/OFF
   Toggles active function ON and OFF.

   F2 T-Fwd
   Accesses Trunking-Forward Channel List.

F3 T-Rvs
Accesses Trunking-Reverse Channel List.

F4 C-Fwd
Accesses Cellular-Forward Channel List.

F5 C-Rvs
Accesses Cellular-Reverse Channel List.

F6 FL
Accesses User Defined Frequency List. Refer to para 3-3-8(A) for information on editing User Defined Frequency List.

5. Frequency List Label

Displays optional Frequency List Label if used. Displays Blank if unused.

6. Output Level

Displays Output Level. If T/R Connector is selected for Output (7), range is -130 to -40 dBm, 0 to .002236 V, 0 to 2.2360 mV or 0.07 to 2236.0 µV. If AUX RF Connector is selected for Output (7), range is -130 to -13 dBm, 0 to 0.050059 V, 0 to 50.0593 mV or 0.07 to 50059.3 µV.

Soft Function Keys available with this field include:

F1 dBm
Selects units of dBm for Output Level.

F2 µV
Selects units of µV for Output Level.

F3 mV
Selects units of mV for Output Level.

F4 V
Selects units of V for Output Level.

F5 SINAD=
Access field to set SINAD Search Function value.

F6 S=On/Off
Toggles SINAD Search Function ON and OFF. SINAD Search Function changes Output Level to search for SINAD= value from UUT. S= Prompt is displayed with function ON.

7. Output

Displays Output Connector. Displays T/R, T/R Gate, AUX or AUX Gate. Gated Output is active only when microphone attached to MIC/ACC Connector is keyed.

Soft Function Keys available with this field include:

F1 T/R
Selects T/R Connector as output connector.

F2 AUX
Selects AUX RF OUT Connector as output connector.

F3 T/R Gate
Selects T/R Connector as output connector. Output is only active when microphone, attached to MIC/ACC Connector, is keyed.

F4 AUX Gate
Selects AUX RF OUT Connector as output connector. Output is only active when microphone, attached to MIC/ACC Connector, is keyed.

8. Modulation Source Window

Displays active Modulation Sources. Inactive Modulation Sources are not shown.

9. Modulation Source Block

Displays Modulation Source. Selections include GEN1 (Audio Generator 1), GEN2 (Audio Generator 2), DTMF (DTMF Tone Generator), DATA (DATA Generator), EXT (External Modulation) and MIC (Microphone Modulation). Refer to para 3-3-1(B) for additional information on Modulation Source Blocks.

10. AUDIO/DATA FILTERS Block

Displays current filter information for selected analog signal. Selections include AF Decode Line, Data Decode Line and Speaker/Headphones Line. Refer to para 3-3-1(C) for additional information on Audio/Data Filters.

11. Soft Function Key Definitions

Functions are redefined with each field of the current operation screen.

12. SINAD/Distortion Meters

Displays selected Meter Operation. Selections include SINAD and Distortion Meters. Refer to para 3-3-1(D) for description of SINAD Meter. Refer to para 3-3-1(E) for description of Distortion Meter.

Soft Function Keys available with this field include:

F1 ZOOM
Expands current meter into full-size meter.

F2 SINAD
Selects SINAD Meter as active meter. Not displayed if meter is active.

F3 DIST
Selects Distortion Meter as active meter. Not displayed if meter is active.

ITEM	DESCRIPTION

13. AF LVL METER

Displays AF LEVEL METER Operation. Refer to para 3-3-1(F) for description of Audio Frequency Level Meter.

Soft Function Keys available with this field include:

F1 ZOOM
Expands current meter into full-size meter.

14. SCOPE/ANALYZER Screen

Displays digitized trace of specified signal as Oscilloscope or Spectrum Analyzer.

15. SCOPE/ANALYZER Prompt

Displays current operation function. Used to toggle between two functions. Refer to para 3-3-3(G) for information on RF Generator Oscilloscope Operation and para 3-3-1(H) for information on RF Generator Spectrum Analyzer Operation.

Soft Function Keys available with this field include:

F1 ZOOM
Accesses expanded version of active function.

F2 ANALY/SCOPE
Accesses inactive function. If SCOPE is active, displays ANALY. If ANALYZER is active, displays SCOPE.

C. DUPLEX RECEIVE GENERAL OPERATION SCREEN

The Duplex Receive Operation Screen is used to define and activate the COM-120A RF Receiver for Duplex Operation. The Duplex Receive Operation Screen is accessed by pressing ZOOM Soft Function Key F1 when cursor is on the Duplex Receive Prompt on the Duplex Operation Screen or by pressing ENTER Key when cursor is on the Duplex Receive Prompt on the Duplex Operation Screen. Once activated, the COM-120A Display shows a screen similar to Figure 3-7.

Because of the level of detail required to fully describe the Duplex Receiver Operation Screen, the operator is referred to other sections in the book for additional detail where required. These sections are contained in para 3-3-2, which covers the RF Receive Operation Screen. The information provided is the same for Duplex or Simplex Receive Operation.

Features and editable parameters on the Duplex Receive Operation Screen are as follows:

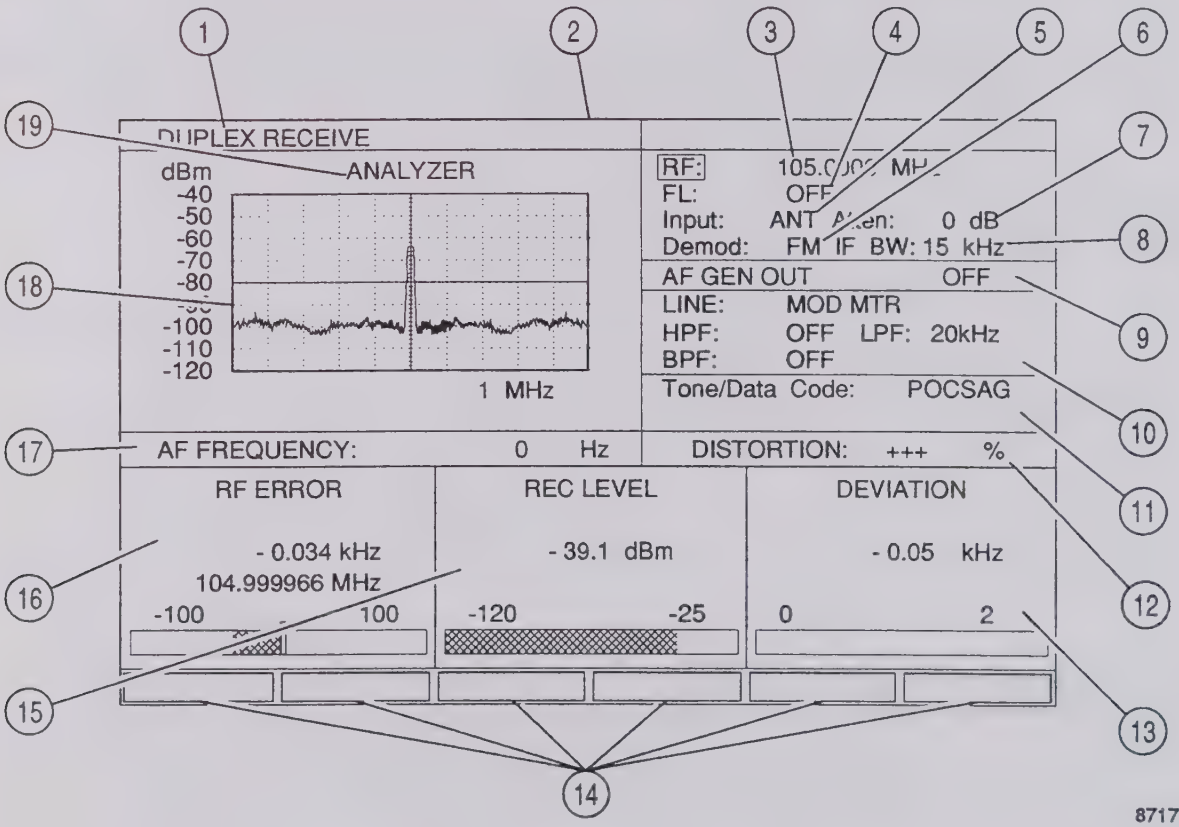


Figure 3-7 Duplex Receive Operation Screen

ITEM	DESCRIPTION

1. Header Bar

   Displays current operation mode.

2. MEMORY Prompt

   If Stored Setup is recalled, displays recalled number (01-99) and Label if used. Blank if Duplex Receive Operation Screen is in active mode.

3. RF Field

   Displays current Duplex Receive Frequency from 0.2500 to 1000.0000 MHz.

   Soft Function Keys available with this field include:

   F1 Δ=
   Accesses window to set Duplex Receive RF Field change increment. With Δ= active, Soft Function Keys are defined as follows:

   F6 RETURN
   Closes window and returns to normal operation.

   F2 Δ On/Off
   Toggles Δ Function OFF and ON. If Δ Function is active,"Δ" is displayed by Frequency Readout.

   F5 PAIR/UNPAIR
   Toggles PAIR Function ON and OFF. With function active, UNPAIR is displayed. Function Ties Duplex Generate Frequency and RF Field together as Pair with specified Frequency Offset. With Pair Function active, editing RF Field changes Duplex Generate Frequency.

4. FL (Frequency List) Setting

   Displays selected Frequency List number (FL-00 through FL-99) when active and OFF when inactive. RF Field (3) echoes frequency of selected Frequency List setting. Directly editing RF Field (3) inactivates FL Setting. Displays optional Frequency List Label if used. Blank if unused. If Frequency List Label is used, can be accessed to scroll through all Frequency List entries with common first three characters.

   Soft Function Keys available with this field include:

   F1 ON/OFF
   Toggles active function ON and OFF.

   F2 T-Fwd
   Accesses Trunking-Forward Channel List.

   F3 T-Rvs
   Accesses Trunking-Reverse Channel List.

F4 C-Fwd
Accesses Cellular-Forward Channel List.

F5 C-Rvs
Accesses Cellular-Reverse Channel List.

F6 FL
Accesses User Defined Frequency List. Refer to para 3-3-8(A) for information on editing User Defined Frequency List.

5. INPUT Connector

Displays connector selected for input. Displays either T/R or ANT.

Soft Function Keys available with this field include:

F1 T/R
Selects T/R Connector as input connector.

F2 ANT
Selects ANTENNA Connector as input connector.

6. Demodulation Type

Displays selected Demodulation Type. Selections include FM, AM or PM.

Soft Function Keys available with this field include:

F1 FM
Selects FM Demodulation.

F2 AM
Selects AM Demodulation.

F3 PM
Selects PM Demodulation.

7. Attenuation

Displays selected attenuation of input signal. Displays either 0 or 30.

Soft Function Keys available with this field include:

F1 30 dB
Selects 30 dB Attenuation.

F2 0 dB
Selects 0 dB Attenuation.

8. IF BANDWIDTH

Displays selected IF Bandwidth. Selections include 15 and 300 kHz.

Soft Function Keys available with this field include:

F1 300 kHz
Selects 300 kHz bandpass filter as active filter.

F2 15 kHz
Selects 15 kHz bandpass filter as active filter.

9. AF GEN OUT Field

Pressing ENTER while cursor is on this field accesses setup menu for Audio/Data Generator sources. Menu displays each source individually. Refer to para 3-3-6 for more information on each source. Sources available include GEN1 (Audio Generator 1), GEN2 (Audio Generator 2), DTMF (DTMF Tone Generator) and DATA (DATA Generator).

Soft Function Keys available with this field include:

F1 ZOOM
Expands window to allow editing of Audio/Data Generators. Soft Function Keys available with this function are:

F1 GEN1
Accesses GEN1 Setup Menu.

F2 GEN2
Accesses GEN2 Setup Menu.

F3 DATA
Accesses DATA Setup Menu.

F4 DTMF
Accesses DTMF Setup Menu.

F6 RETURN
Returns unit to normal RF Receive Operation.

10. AUDIO/DATA FILTERS Block

Displays current filter information for selected analog signal. Selections include Modulation Meters Line, AF Decode Line, AF Counter Line, Data Decode Line and Speaker/Headphones Line. Refer to para 3-3-2(B) for additional information on Audio/Data Filters.

11. TONE/DATA CODE Field

Displays selected Tone/Data Type and decoded data. Selections for Tone/Data Type available with standard COM-120A include:

DCS DTMF USER
DCS INV (DCS Inverted)

Additional selections are shown, but are unusable unless Option 09 or Option 11 is installed. Additional selections available include:

CCIR	CCIRH	CCIRH4
EEA	EIA	NATEL
ZVEI	DZVEI	DDZEI
EURO	5/6 TONE	POGSAG

POCSAG/ (POCSAG Inverted)

Soft Function Keys available with this field include:

F1 MENU
Displays TONE/DATA Type selections. Soft Function Keys available include:

F6 RETURN
Returns COM-120A to normal RF Receive Operation.

F2 DECODE
Activates DECODE Function for specified Audio/Data type. Accesses Tone Decode Screen for Signalling formats, POCSAG Decode Screen for POCSAG Decode Function and initiates decoding function for DCS and DCS Inverted Functions. Refer to 3-3-2(C) for further information on the decode screens.

Soft Function Keys available with USER selected for TONE/DATA Type include:

F4 CONFIG
Accesses Configuration Window for configuring User Selectable Frequency and Duration for codes 0 through 9 and A through T. With Configuration Window, active Soft Function Keys are defined as follows:

F1 PG UP
Used to scroll up through Configuration Window.

F2 PG DN
Used to scroll down through Configuration Window.

F3 FILL
Fills remainder of selected column with value of current cursor position.

F6 RETURN
Exits Configuration Window into normal RF Receive operation.

ITEM	DESCRIPTION

12. DISTORTION/SINAD/MODULATION Reading

Displays distortion reading of received signal if Distortion is selected. Displays SINAD reading of received signal if SINAD is selected. Displays modulation reading in units of selected Demodulation Type (6) if Modulation is selected. This field is interactive with DISTORTION/SINAD/MODULATION Meter (13). This field displays reading only while DISTORTION/SINAD/MODULATION Meter (13) displays meter. The same reading cannot be displayed twice. Selection of a specific reading changes source of nonedited field to other source. One source must always be Modulation. Refer to para 3-3-2(D) for information on the RF Receive SINAD Meter, para 3-3-2(E) for information on the Distortion Meter, para 3-3-2(F) for information on the FM Deviation Meter, para 3-3-2(G) for information on the AM Modulation Meter and para 3-3-2(H) for information on the Phase Modulation Meter.

Soft Function Keys available with this field include:

F1 ZOOM
Selects Meter Operation Screen of currently active meter.

F2 SINAD
Selects SINAD reading as active. Blank if SINAD currently active.

F3 DIST
Selects Distortion reading as active. Blank if DIST currently active.

F4 DEV
Selects Modulation reading as active. Blank if DEV currently active. Modulation reading unit type is tied to Demodulation Type (6).

13. DISTORTION/SINAD/MODULATION Meter

Displays distortion reading of received signal if Distortion is selected. Displays SINAD reading of received signal if SINAD is selected. Displays modulation reading in units of selected Demodulation Type (6) if Modulation is selected. This field is interactive with DISTORTION/SINAD/MODULATION Reading (12). This field displays complete meter while DISTORTION/SINAD/MODULATION Reading (12) displays reading only. The same reading cannot be displayed twice. Selection of a specific reading changes source of nonedited field to other source. One source must always be Modulation. Refer to para 3-3-2(D) for information on the RF Receive SINAD Meter, para 3-3-2(E) for information on the Distortion Meter, para 3-3-2(F) for information on the FM Deviation Meter, para 3-3-2(G) for information on the AM Modulation Meter and para 3-3-2(H) for information on the Phase Modulation Meter.

Soft Function Keys available with this field include:

F1 ZOOM
Selects Meter Operation Screen of currently active meter.

F2 SINAD
Selects SINAD Meter as active meter. Blank if SINAD currently active.

F3 DIST
Selects Distortion Meter as active meter. Blank if DIST currently active.

F4 DEV
Selects Modulation Meter as active meter. Blank if DEV currently active. Modulation reading unit type is tied to Demodulation Type (6).

14. Soft Function Key Definitions

Functions are redefined with each field of the current operation screen.

15. Power/Received Level Meter

Power Meter displays power level of signal received through T/R Connector only in dB and Watts. RECEIVED LEVEL Meter displays referenced Power Level of signal received through ANTENNA Connector only in dBm and μV. Refer to para 3-3-2(I) for description of Power Meter and para 3-3-2(J) for description of Received Level Meter.

Soft Function Keys available with this field include:

F1 ZOOM
Selects Meter Operation Screen of currently active meter.

16. RF ERROR Meter

Displays difference in RF Field (3) and frequency of received signal. Refer to para 3-3-2(K) for description of RF ERROR Meter.

Soft Function Keys available with this field include:

F1 ZOOM
Selects Meter Operation Screen of RF ERROR Meter.

17. AF FREQUENCY Meter

Displays Audio Frequency of received signal. Refer to para 3-3-2(L) for description of AF FREQUENCY Meter.

Soft Function Keys available with this field include:

F1 ZOOM
Selects Meter Operation Screen of AF FREQUENCY Meter.

18. SCOPE/ANALYZER Screen

Displays digitized trace of specified signal as Oscilloscope or Spectrum Analyzer.

19. SCOPE/ANALYZER Prompt

Displays current operation function. Used to toggle between two functions. Refer to para 3-3-2(M) for information on Duplex Receiver Oscilloscope Operation and para 3-3-2(N) for information on Duplex Receiver Spectrum Analyzer Operation.

ITEM	DESCRIPTION

Soft Function Keys available with this field include:

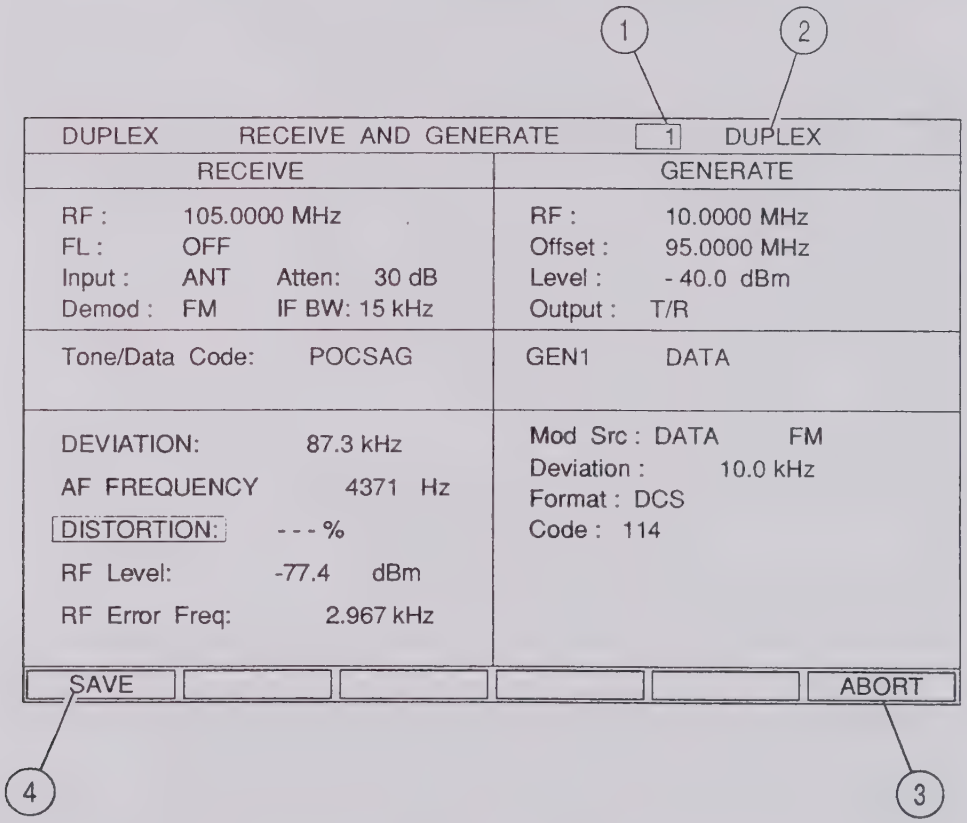
F1 ZOOM
Accesses expanded version of active function.

F2 ANALY/SCOPE
Accesses inactive function. If SCOPE is active, displays ANALY. If ANALYZER is active, displays SCOPE.

D. STORE AND RECALL OPERATION

Pressing STORE Memory Key allows the operator to store up to 50 Duplex Operation Screen configurations. Storage Locations 0 through 49 can be used to store an RF Generate Operation configuration, RF Receive Operation configuration or Duplex Operation configuration (Receive and Generate pair). Refer to para 3-3-8(B) for information on the Setup List that displays all Memory Locations, operation types and associated Memory Location Label (2).

Pressing STORE Memory Key when in Duplex Operation Screen accesses the following fields:



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ITEM	DESCRIPTION

1. Memory Location

   Displays selected Memory Location for storage of current configuration. Refer to para 3-3-8(B) for information on the Setup List that displays all Memory Locations, operation types and associated Memory Location Label (2).

2. Memory Location Label

   Displays optional alphanumeric label for selected Memory Location.

ITEM	DESCRIPTION

3. ABORT Soft Function Key F6

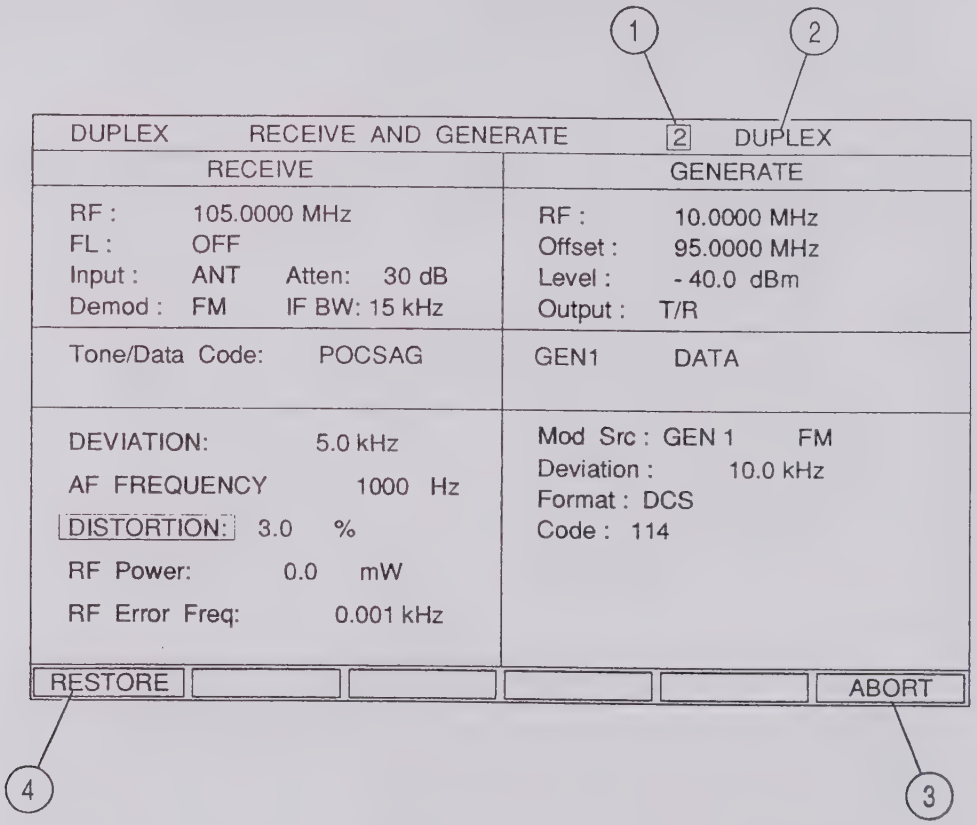
   Escapes Storage Operation without performing any edit. SAVE Soft Function Key F1 (4) or ABORT Soft Function Key F6 must be pressed to return to normal operation.

4. SAVE Soft Function Key F1

   Finalizes Storage Operation. SAVE Soft Function Key F1 or ABORT Soft Function Key F6 (3) must be pressed to return to normal operation.

Pressing RCL Memory Key allows the operator to recall up to 100 previously stored operation screens. RF Receive, RF Generate or Duplex Operation Screen configurations and all can be accessed from the Duplex Operation Screen. Accessing anything other than a Duplex Operation Screen configuration, automatically switches the COM-120A to the selected mode of operation. Refer to para 3-3-8(B) for information on the Setup List that displays all Memory Locations, operation types and associated Memory Location Label (2).

Pressing RCL Memory Key when in Duplex Operation Screen accesses the following fields:



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ITEM	DESCRIPTION

1. Memory Location

   Displays selected Memory Location for recall of stored configuration. Refer to para 3-3-8(B) for information on the Setup List that displays all Memory Locations, operation types and associated Memory Location Label (2).

2. Memory Location Label

   Displays optional alphanumeric label for selected Memory Location.

ITEM	DESCRIPTION

3. ABORT Soft Function Key F6

   Escapes Storage Operation without performing any edit. RESTORE Soft Function Key F1 (4) or ABORT Soft Function Key F6 must be pressed to return to normal operation.

4. RESTORE Soft Function Key F1

   Finalizes Recall Operation. RESTORE Soft Function Key F1 or ABORT Soft Function Key F6 (3) must be pressed to return to normal operation.

3-3-4 OSCILLOSCOPE OPERATION SCREEN

The Independent Oscilloscope Operation Screen operates as an independent piece of test equipment. Input for Oscilloscope Operation is through the SCOPE/DVM Connector. The Oscilloscope Operation Screen is accessed by pressing the SCOPE Instruments Key. Once activated, the COM-120A Display shows a display similar to Figure 3-8. When accessed, the Oscilloscope Operation Screen is set up in the configuration last used.

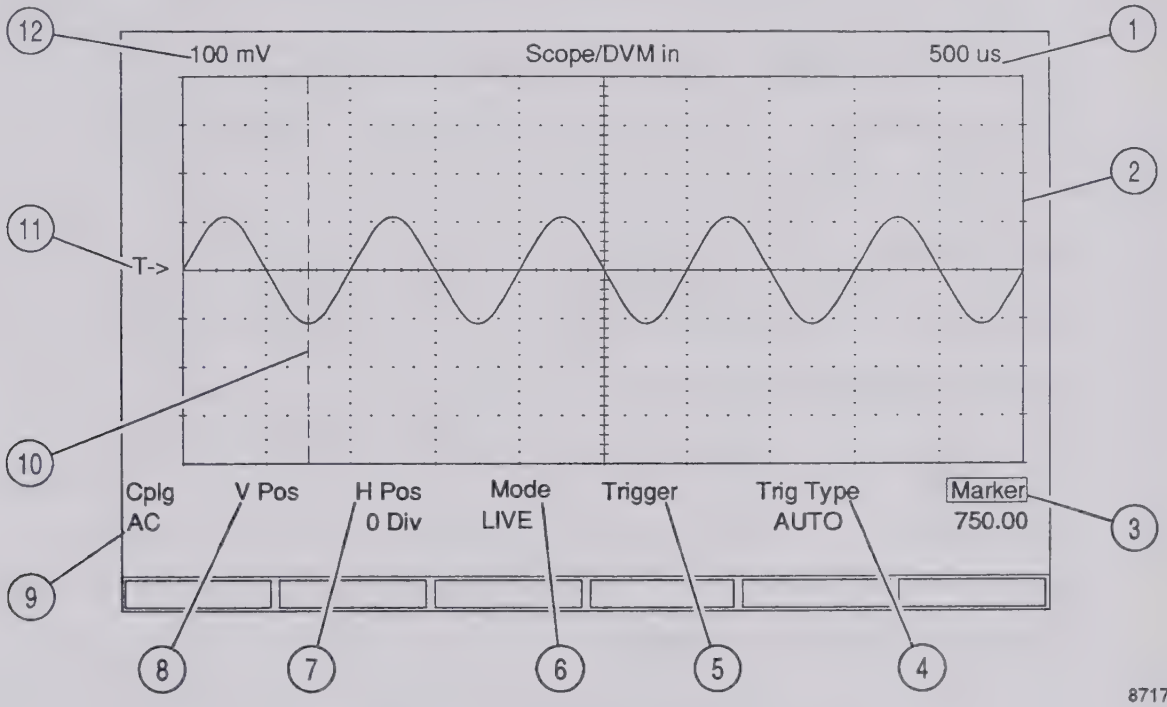


Figure 3-8 Oscilloscope Operation Screen

ITEM	DESCRIPTION

1. Sweep

Displays selected Oscilloscope Sweep. Selections include:

100 µs/Div	200 µs/Div	500 µs/Div
1 ms/Div	2 ms/Div	5 ms/Div
10 ms/Div	20 ms/Div	50 ms/Div
100 ms/Div		

Soft Function Keys available include:

F1 MENU
Accesses Menu to set Oscilloscope Scale.

Soft Function Keys available include:

F6 RETURN
Exits Menu into normal operation.

2. Oscilloscope Screen

Displays digitized trace of specified signal.

3. Marker Position

Displays current Marker Position if Marker (10) is active or OFF if inactive. Value for Marker Position is in same units as Sweep (1) with Trigger point as reference.

Soft Function Keys available include:

F1 On/Off
Toggles Marker (10) between ON and OFF.

4. Trigger Type

Displays selected Trigger Type. Selections include Auto, One Shot and Normalized.

Soft Function Keys available include:

F1 NORM
Selects Normalized as Trigger Type.

F2 AUTO
Selects Auto as Trigger Type.

F3 1 SHOT
Selects One Shot as Trigger Type. Pressing 1 SHOT Soft Function Key reenables Trigger.

5. Trigger

Adjusts trigger level as indicated by Trigger Level Indicator (11) when accessed.

6. Mode

Displays selected Operation Mode. Selections include Live, Compare, Recall, Store AND Average.

Soft Function Keys available include:

F2 LIVE
Selects LIVE as Oscilloscope Operation Mode.

F3 AVG
Selects AVERAGE as Oscilloscope Operation Mode.

F4 COMPARE
Selects COMPARE as Oscilloscope Operation Mode.

F5 RECALL
Selects RECALL as Oscilloscope Operation Mode.

F6 STORE
Selects STORE as Oscilloscope Operation Mode.

7. H Pos

Displays selected horizontal offset in major divisions. Selections range from -10 to +10 Divisions.

8. V Pos

Accesses vertical position of trace. Trace above or below screen is indicated by straight line trace at top or bottom graticule.

9. Coupling

Displays selected Oscilloscope Coupling. Selections include AC, DC and GND (Ground).

Soft Function Keys available include:

F1 GND
Selects GND (Ground) as Oscilloscope Coupling.

F2 AC
Selects AC as Oscilloscope Coupling.

F3 DC
Selects DC as Oscilloscope Coupling.

10. Marker

User editable Marker controlled using MARKER Position (3). Movable through extent of visible screen.

11. Trigger Level Indicator

Indicates approximate level of Oscilloscope Trigger Level. Editable using TRIGGER (5).

12. Oscilloscope Scale

Displays selected Oscilloscope Vertical Scale. Scales available include:

10 mV	20 mV	50 mV
100 mV	200 mV	500 mV
1 V	2 V	5 V
10 V	20 V	50 V

Soft Function Keys available include:

F1 MENU
Accesses Menu to set Oscilloscope Scale. Soft Function Keys available include:

F6 RETURN
Exits Menu into normal operation.

3-3-5 SPECTRUM ANALYZER OPERATION SCREEN

The Independent Spectrum Analyzer Operation Screen operates independent of the Test Modes. The Spectrum Analyzer Operation Screen is accessed by pressing the ANLYZ Instruments Key. Once activated, the COM-120A Display shows a display similar to Figure 3-9. When accessed, the Spectrum Analyzer Operation Screen is set up in the configuration last used.

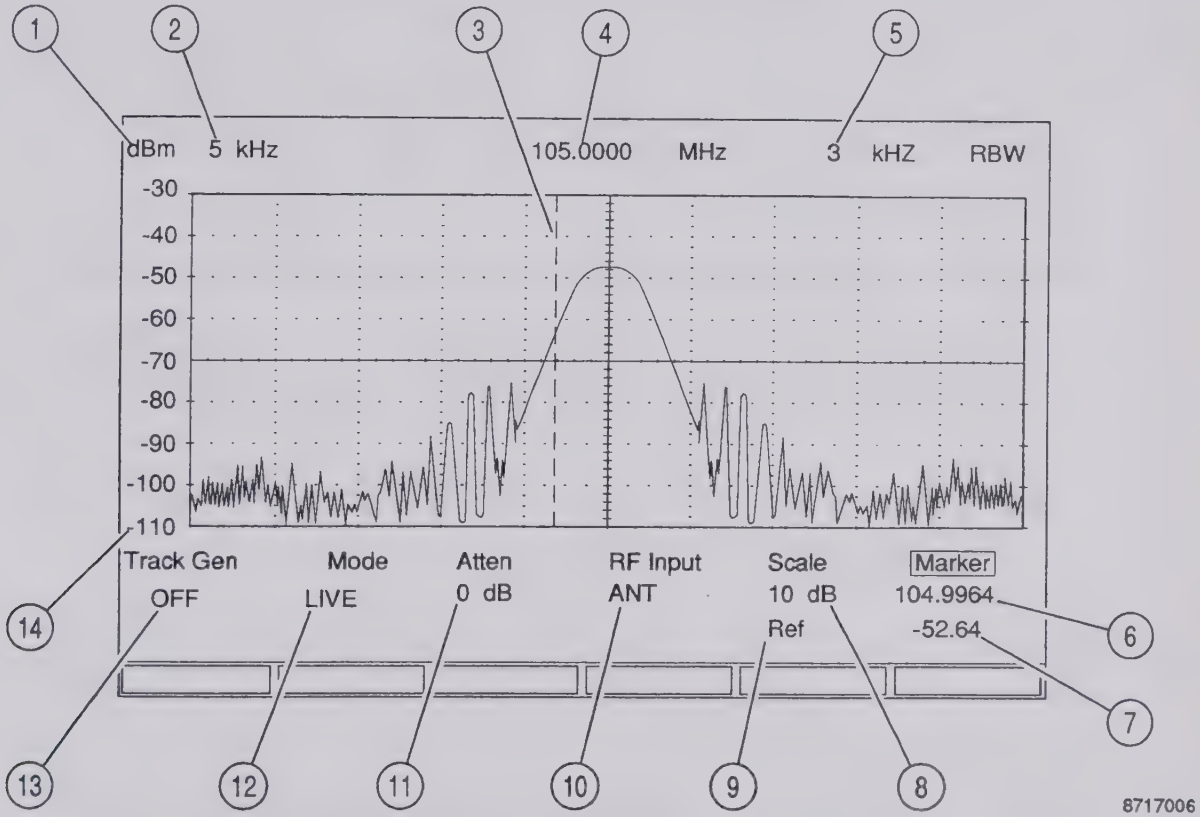


Figure 3-9 Spectrum Analyzer Operation Screen

ITEM	DESCRIPTION

1. Logarithmic Function

Displays Logarithmic Function for referencing Vertical Scale (14). Selections include dBm, dBµV, dBmV, dBV, dBµW and dBW.

Soft Function Keys available include:

F1 dBm
Selects dBm as Logarithmic Function.

F2 dBµV
Selects dBµV as Logarithmic Function.

F3 dBmV
Selects dBmV as Logarithmic Function.

F4 dBV
Selects dBV as Logarithmic Function.

F3 dBμW
Selects dBμW as Logarithmic Function.

F4 dBW
Selects dBW as Logarithmic Function.

2. Scan Width

Displays selected Scan Width per division. Selections include zero scan and:

1 kHz/Div	2 kHz/Div	5 kHz/Div
10 kHz/Div	20 kHz/Div	50 kHz/Div
100 kHz/Div	200 kHz/Div	500 kHz/Div
1 MHz		

F1 MENU
Accesses Menu to set Scan Width. Soft Function Keys available include:

F6 RETURN
Exits Menu into normal operation.

3. Marker

Marker controlled using Marker Position (6). Movable through extent of visible screen.

4. Center Frequency

Displays Center Frequency. Selections range from 0.2500 to 1000.0000 MHz.

F1 Set Ref
Adjusts Spectrum Analyzer to reference level. Function must be performed when frequency is changed for greatest accuracy.

F2 Find
Starts Find Function. Find Function searches for first signal with level exceeding reference set by Find Lvl Soft Function Key F3. Search limits are twice Sweep Width, set by Config Soft Function Key F4, centered around Center Frequency.

F3 Find Lvl
Sets Find Function reference level. Activates horizontal Marker to set level. Marker level is set by DATA SCROLL Keys or DATA SCROLL Spinner. Press Soft Key to exit.

F4 Config
Accesses window for setting Sweep Width for Find Function. Range of Sweep Width is 0.2000 to 500.0000 MHz. Press Soft Key to exit.

F5 Split
Accesses Split Screen Function. Split Screen Spectrum Analyzer allows two Center Frequencies. Soft Function Keys available include:

F1 Normal
Sets Spectrum Analyzer to Normal single Center Frequency Operation.

F6 LOCK/UNLOCK
Sets RF Generate RF Field and RF Receive RF Field to frequency of Center Frequency. Edits to RF Field or Center Frequency change all values. With Function active, L is displayed by Center Frequency and label is UNLOCK.

5. Resolution Bandwidth

Displays Resolution Bandwidth for selected Scan Width (2). Field is for display only.

6. Marker Position

Displays Marker Position if Marker (3) is active or OFF if inactive. Units are same as Scan Width (2). Referenced to Center Frequency (4).

Soft Function Keys available include:

F1 On/Off
Toggles Marker (3) between ON and OFF.

7. Marker Level

Displays current Marker Level if Marker (3) is active. Displays Blank if Marker (3) is OFF.

8. Scale

Displays Logarithmic Scale for Vertical Scale (14). Selections are 2 and 10 dB.

F1 10 dB
Selects 10 dB Logarithmic Scale for Spectrum Analyzer Vertical Scale (14).

F2 2 dB
Selects 2 dB Logarithmic Scale for Spectrum Analyzer Vertical Scale (14).

9. Reference

Adjusts Spectrum Analyzer Vertical Scale (14) ±10 dB when Scale (8) is set to 10 dB. When Scale (8) is set to 2 dB, adjusts Spectrum Analyzer Vertical Scale (14) through full range, displaying 16 dB window and incrementing in 1 dB steps.

10. RF Input

Displays RF Input. Selections are ANT (ANTENNA Connector) and T/R (T/R Connector).

Soft Function Keys available include:

F1 T/R
Selects T/R Connector as RF Input Connector.

F2 ANT
Selects ANTENNA Connector as RF Input Connector.

11. Attenuation

Displays selected Attenuation for RF Input (10). Selections include 0 and 30 dB.

Soft Function Keys available include:

F1 30 dB
Selects 30 dB Attenuation for RF Input (10).

F2 0 dB
Selects 0 dB Attenuation for RF Input (10).

12. Mode

Displays Operation Mode. Selections include Peak Hold, Live, Compare, Recall, Store and Average.

Soft Function Keys available include:

F1 PKHOLD
Selects PEAK HOLD as Spectrum Analyzer Operation Mode.

F2 LIVE
Selects LIVE as Spectrum Analyzer Operation Mode.

F3 AVG
Selects AVERAGE as Spectrum Analyzer Operation Mode.

F4 COMPARE
Selects COMPARE as Spectrum Analyzer Operation Mode.

F5 RECALL
Selects RECALL as Spectrum Analyzer Operation Mode.

F6 STORE
Selects STORE as Spectrum Analyzer Operation Mode.

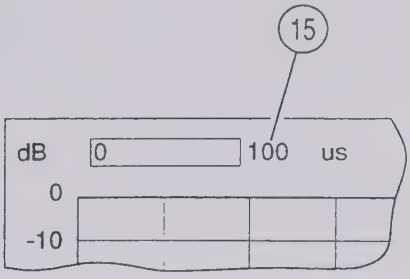
13. Tracking Generator (Option 12)

Displays Tracking Generator Signal level available at AUX RF OUT Connector when active and OFF when inactive. Displayed only with Option 12 installed.

14. Vertical Scale

Provides logarithmic scale for trace. Position is controlled by Reference (9).

When Scanwidth (2) is set to Zero Scan the following field becomes active:



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ITEM	DESCRIPTION

15. Zero Scan Sweep

Displays selected Sweep per division when Scan Width (2) is set to Zero Scan. Selections include:

100 µs/Div	200 µs/Div	500 µs/Div
1 ms/Div	2 ms/Div	5 ms/Div
10 ms/Div	20 ms/Div	50 ms/Div
100 ms/Div		

3-3-6 AUDIO/DATA/SIGNALING GENERATORS OPERATION SCREEN

The Audio/Data/Signaling Generators Operation Screen operates as an independent piece of test equipment. The Audio/Data/Signaling Generators Operation Screen is accessed by pressing the AUDIO GEN Instruments Key. Once activated, the COM-120A Display shows a display similar to Figure 3-10. When accessed, the Audio/Data/Signaling Generators Operation Screen is set up in the configuration ast used.

Because of the level of detail required to fully describe the Audio/Data/Signaling Generators Operation Screen, the information is split into several sections. The first section gives a description of the main screen and refers the reader to other sections that describe one topic in detail.

Section	Title	Page
A.	Audio/Data/Signaling Generators General Operation Screen	3-188
B.	Audio Generator 1	3-190
C.	Audio Generator 2	3-194
D.	DTMF Generator	3-196
E.	DATA Generator	3-198

A. AUDIO/DATA/SIGNALING GENERATORS GENERAL OPERATION SCREEN

The Audio/Data/Signaling Generators Operation Screen displays four different generators simutaneously. Generators displayed include Audio Generator 1, Audio Generator 2, DTMF Generator and DATA Generator. Any or all of these sources may be active. Output for these generators is through the AUDIO/DATA GEN Connector. Editing these sources can be performed from this screen, the RF Receive Operation Screen or the Duplex Receive Operation Screen.

Pressing AUDIO GEN Instruments Key accesses Audio/Data/Signaling Generators Operation Screen similar to Figure 3-10. When accessed, the Audio/Data/Signaling Generators Operation Screen is set up in the configuration last used.

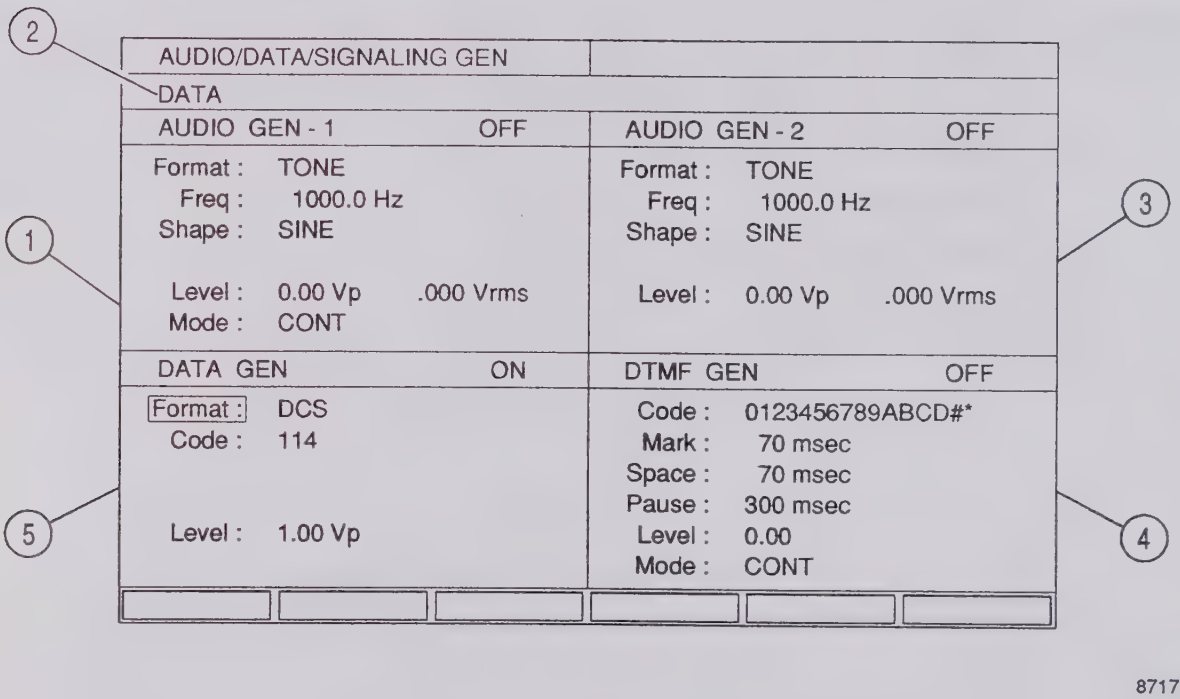


Figure 3-10 Audio/Data/Signaling Generator Operation Screen

ITEM	DESCRIPTION

1. Audio Generator 1 Section

   Defines and activates Audio Generator 1. Refer to para 3-3-6(B) for additional information.

2. Active Source Block

   Displays all active sources. Sources include GEN1 (Audio Generator 1), GEN2 (Audio Generator 2), DTMF (DTMF Tone Generator) and DATA (DATA Generator).

ITEM	DESCRIPTION

3. Audio Generator 2 Section

   Defines and activates Audio Generator 2. Refer to para 3-3-6(C) for additional information.

4. DTMF Generator Section

   Defines and activates DTMF Generator. Refer to para 3-3-6(D) for additional information.

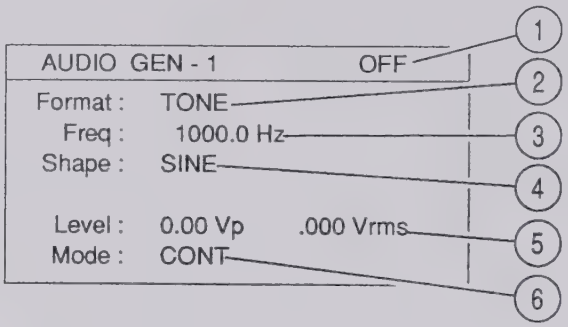
5. DATA Generator Section

   Defines and activates DATA Generator. Refer to para 3-3-6(E) for additional information.

B. AUDIO GENERATOR 1

The Audio/Data/Signaling Generators Operation Screen displays four different generators simutaneously. Generators displayed include Audio Generator 1, Audio Generator 2, DTMF Generator and DATA Generator. Any or all of these sources may be active. Output for generators is through the AUDIO/DATA GEN Connector. Editing these sources is performed from this screen, the RF Receive Operation Screen or the Duplex Receive Operation Screen.

Functions and parameters for Audio Generator 1 are as follows:



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ITEM	DESCRIPTION

1. Audio Generator 1 Prompt

Activates selected Generator Source. Selections include GEN1 (Audio Generator 1), GEN2 (Audio Generator 2), DTMF (DTMF Tone Generator) and DATA (DATA Generator).

Soft Function Keys available include:

F1 GEN1
Activates Audio Generator 1.

F2 GEN2
Activates Audio Generator 2.

F3 DATA
Activates DATA Generator.

F4 DTMF
Activates DTMF Generator.

2. Format

Displays Format type for Audio Generator 1. Selections in standard COM-120A are limited to TONE and USER.

Additional selections are shown, but are unusable unless Option 09 or Option 11 is installed. Refer to Section 6 for additional information on options. Additional selections available include:

EEA	EURO	EIA
5/6 TONE	ZVEI	NATEL
DZVEI	10 PS	DDZVEI
20 PS	CCIR	MTS
CCIRH	IMTS	CCIRH4
TONE REMOTE		

Soft Function Keys available include:

F1 MENU
Accesses menu for selecting Format. Soft Function Keys available include:

F6 RETURN
Exits Menu into normal operation.

Additional Soft Function Keys available when USER is selected as Format include:

F2 CONFIG
Accesses Configuration Window for configuring User Selectable Frequency and Duration for codes 0 through 9 and A through T. With Configuration Window active, Soft Function Keys are defined as follows:

F1 PG UP
Used to scroll up through Configuration Window.

F2 PG DN
Used to scroll down through Configuration Window.

F3 FILL
Fills remainder of selected column with value of current cursor position.

F6 RETURN
Exits Configuration Window into normal operation.

Additional Soft Function Keys available when TONE REMOTE is selected as Format include:

F2 XMIT
Activates Tone Remote generation.

3. Tone Frequency

Displays selected Audio Tone Frequency. Selections range from 5 to 20000 Hz with SINE selected as Shape (4) and 5 to 10000 Hz for other settings of Shape (4). Visible as Tone Frequency only when TONE or TONE Remote is active Format (2).

4. Shape

Displays selected Wave Shape of Modulation Source. Selections include SINE, SQUARE, RAMP and TRIANGLE. Active only with TONE selected as Format (2).

Soft Function Keys available include:

F1 SINE
Selects SINE as active Wave Shape.

F2 RAMP
Selects RAMP as active Wave Shape.

F3 TRIANGLE
Selects TRIANGLE as active Wave Shape.

F4 SQUARE
Selects SQUARE as active Wave Shape.

5. Level

Displays selected Level of Audio Generator 1. Selections range from 0 to 2.5 Vp in X1 (times 1) Mode and 0 to 25.0 mVp in /100 (divide by 100) Mode. Level is displayed in Vrms.

Soft Function Keys available include:

F1 X1
Activates X1 Mode for Level.

F2 /100
Activates /100 Mode for Level.

6. Mode

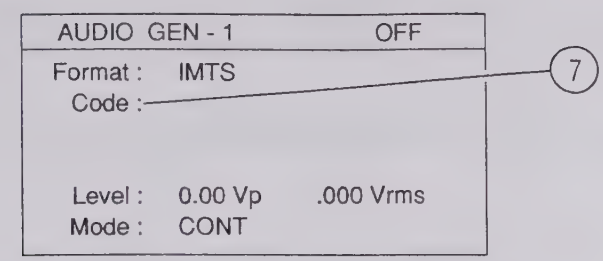
Displayed selected Mode for generation of signal. Selections are CONT (Continuous) and BURST. Additionally, if TONE is selected as Format (2) and BURST Mode is selected, T= field appears for entering duration time for TONE Burst. Time duration ranges from 0 to 30 seconds.

Soft Function Keys available include:

F1 CONT
Selects Continuous Output Mode for Audio Generator 1.

F2 BURST
Selects Burst Output Mode for Audio Generator 1.

With Format (2) set to any selection other than TONE or TONE REMOTE, the following field appears in place of Tone Frequency (3).



8717081

ITEM	DESCRIPTION

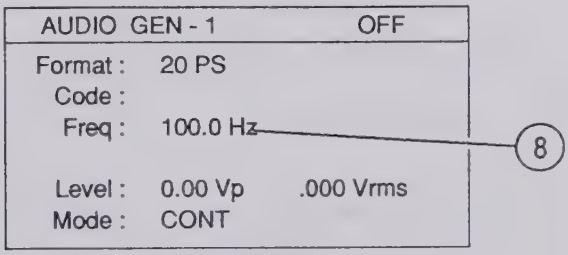
7. Code

Displays selected code for specified Format (2).

Soft Function Keys available include:

F1 CLEAR
Clears current CODE entry.

With Format (2) set to 10 PS or 20 PS the following field appears.



8717080

ITEM	DESCRIPTION

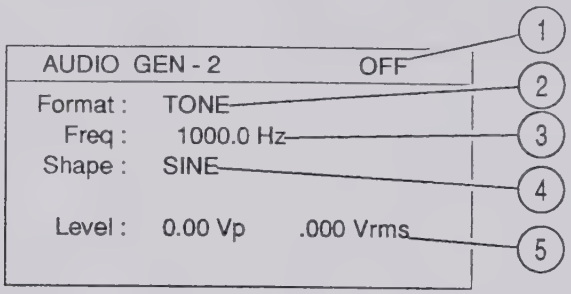
8. Tone Freq

Displays selected Pulse Frequency. Selection ranges from 0 to 20000 Hz.

C. AUDIO GENERATOR 2

The Audio/Data/Signaling Generators Operation Screen displays four different generators simutaneously. Generators displayed include Audio Generator 1, Audio Generator 2, DTMF Generator and DATA Generator. Any or all of these sources may be active. Output for generators is through the AUDIO/DATA GEN Connector. Editing these sources is performed from this screen, the RF Receive Operation Screen or the Duplex Receive Operation Screen.

Functions and parameters for Audio Generator 2 are as follows:



8717065

ITEM	DESCRIPTION

1. Audio Generator 2 Prompt

   Activates selected Generator Source. Selections include GEN1 (Audio Generator 1), GEN2 (Audio Generator 2), DTMF (DTMF Tone Generator) and DATA (DATA Generator).

   Soft Function Keys available include:

   F1 GEN1
   Activates Audio Generator 1.

   F2 GEN2
   Activates Audio Generator 2.

   F3 DATA
   Activates DATA Generator.

   F4 DTMF
   Activates DTMF Generator.

ITEM	DESCRIPTION

2. Format

   Displays Format type for Audio Generator 2. Selection is limited to TONE.

3. Tone Frequency

   Displays selected Audio Tone Frequency for Audio Generator 2. Selection is limited to 1 kHz tone.

4. Shape

   Displays selected Wave Shape for Audio Generator 2. Selection is Limited to SINE only.

5. Level

   Displays selected Level of Audio Generator 2. Selections range from 0 to 2.5 Vp in X1 (times 1) Mode and 0 to 25.0 mVp in /100 (divide by 100) Mode. Level is displayed in Vrms.

   Soft Function Keys available include:

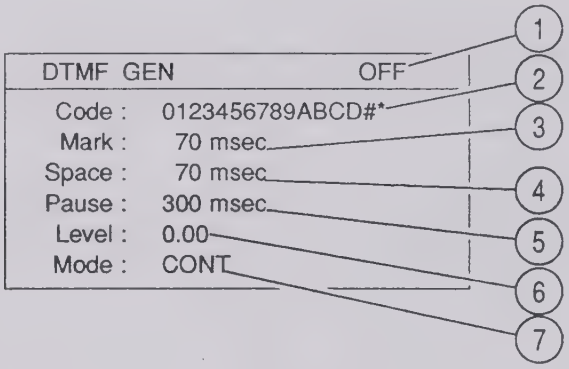
   F1 X1
   Activates X1 Mode for Level.

   F2 /100
   Activates /100 Mode for Level.

D. DTMF GENERATOR

The Audio/Data/Signaling Generators Operation Screen displays four different generators simutaneously. Generators displayed include Audio Generator 1, Audio Generator 2, DTMF Generator and DATA Generator. Any or all of these sources may be active. Output generators is through the AUDIO/DATA GEN Connector. Editing these sources is performed from this screen, the RF Receive Operation Screen or Duplex Receive Operation Screen.

Functions and parameters for DTMF Generator are as follows:



8717067

ITEM	DESCRIPTION

1. DTMF Generator Prompt

   Activates selected Generator Source. Selections include GEN1 (Audio Generator 1), GEN2 (Audio Generator 2), DTMF (DTMF Tone Generator) and DATA (DATA Generator).

   Soft Function Keys available include:

   F1 GEN1
   Activates Audio Generator 1.

   F2 GEN2
   Activates Audio Generator 2.

   F3 DATA
   Activates DATA Generator.

   F4 DTMF
   Activates DTMF Generator.

2. Code

   Displays selected Code for DTMF Generator.

Soft Function Keys available include:

F1 CLEAR
Clears code field of current data.

3. Mark Time

Displays selected dwell time for DTMF tones.

4. Space Time

Displays selected pause time between DTMF tones.

5. Pause Time

Displays selected Pause Time between DTMF tone sequences for continuous function.

6. Level

Displays selected Level of Audio Generator 1. Selections range from 0 to 2.5 Vp in X1 (times 1) Mode and 0 to 25.0 mVp in /100 (divide by 100) Mode.

Soft Function Keys available include:

F1 X1
Activates X1 Mode for Level.

F2 /100
Activates /100 Mode for Level.

7. Mode

Displayed selected Mode for generation of signal. Selections are CONT (Continuous), BURST and KEY. Burst Mode activates DTMF Generator for one loop of selected code. Key Mode configures DATA ENTRY Keys as DTMF Keypad.

Soft Function Keys available include:

F1 CONT
Selects Continuous Output Mode for DTMF Generator.

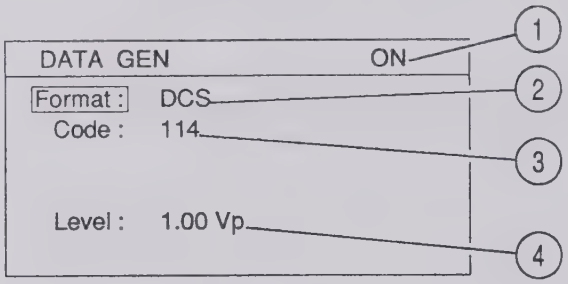
F2 BURST
Selects Burst Output Mode for DTMF Generator.

F3 KEY
Configures DATA ENTRY Keys as DTMF keypad with current key pressed, displayed in Code Field.

E. DATA GENERATOR

The Audio/Data/Signaling Generators Operation Screen displays four different generators simutaneously. Generators displayed include Audio Generator 1, Audio Generator 2, DTMF Generator and DATA Generator. Any or all of these sources may be active. Output for generators is through the AUDIO/DATA GEN Connector. Editing these sources is performed from this screen, RF Receive Operation Screen or Duplex Receive Operation Screen.

Functions and parameters for DATA Generator are as follows:



8717066

ITEM	DESCRIPTION

1. DATA Generator Prompt

   Activates selected Generator Source. Selections include GEN1 (Audio Generator 1), GEN2 (Audio Generator 2), DTMF (DTMF Tone Generator) and DATA (DATA Generator).

   Soft Function Keys available include:

   F1 GEN1
   Activates Audio Generator 1.

   F2 GEN2
   Activates Audio Generator 2.

   F3 DATA
   Activates DATA Generator.

   F4 DTMF
   Activates DTMF Generator.

ITEM	DESCRIPTION

2. Format

   Displays Format type for DATA Generator. Selections include DCS and DCS/ (DCS Inverted).

   Soft Function Keys available with this field include:

   F1 DCS
   Selects DCS as Format type. Activates CODE Field.

   F2 DCS/
   Selects Inverted DCS as Format type. Activates CODE Field.

3. Code

   Displays selected code for DATA Generator.

4. Level

   Displays selected Level of DATA Generator. Selections range from 0 to 2.5 Vp in X1 (times 1) Mode and 0 to 25.0 mVp in /100 (divide by 100) Mode.

   Soft Function Keys available include:

   F1 X1
   Activates X1 Mode for Level.

   F2 /100
   Activates /100 Mode for Level.

3-3-7 METERS OPERATION

The COM-120A contains several meters that are not tied to any Generate or Receive Function. These meters operate independently. Pressing MTRS Instruments Key accesses a Meters Menu, shown in Figure 3-11, for accessing these independent Meters. To access a meter, placer cursor on selection and press ENTER Key.

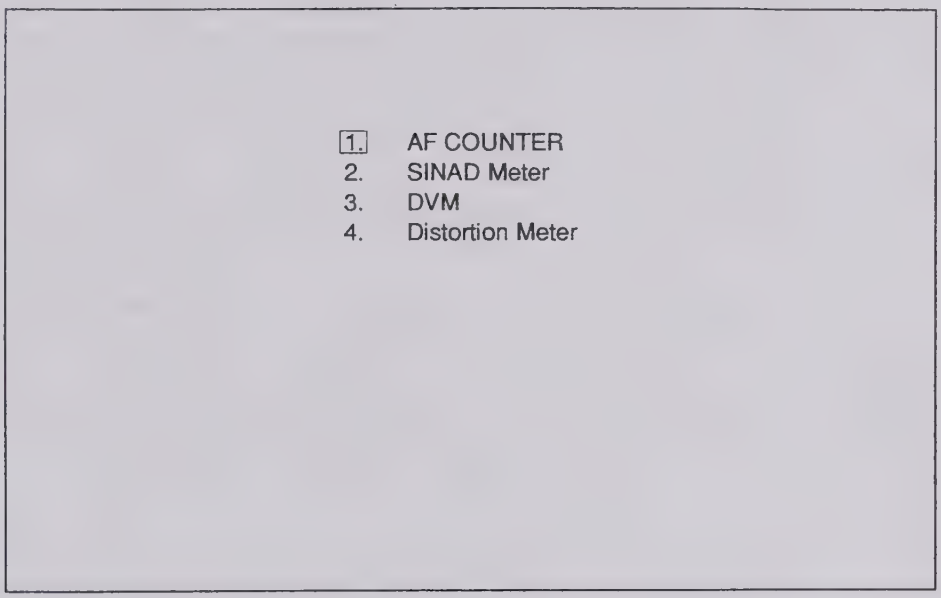
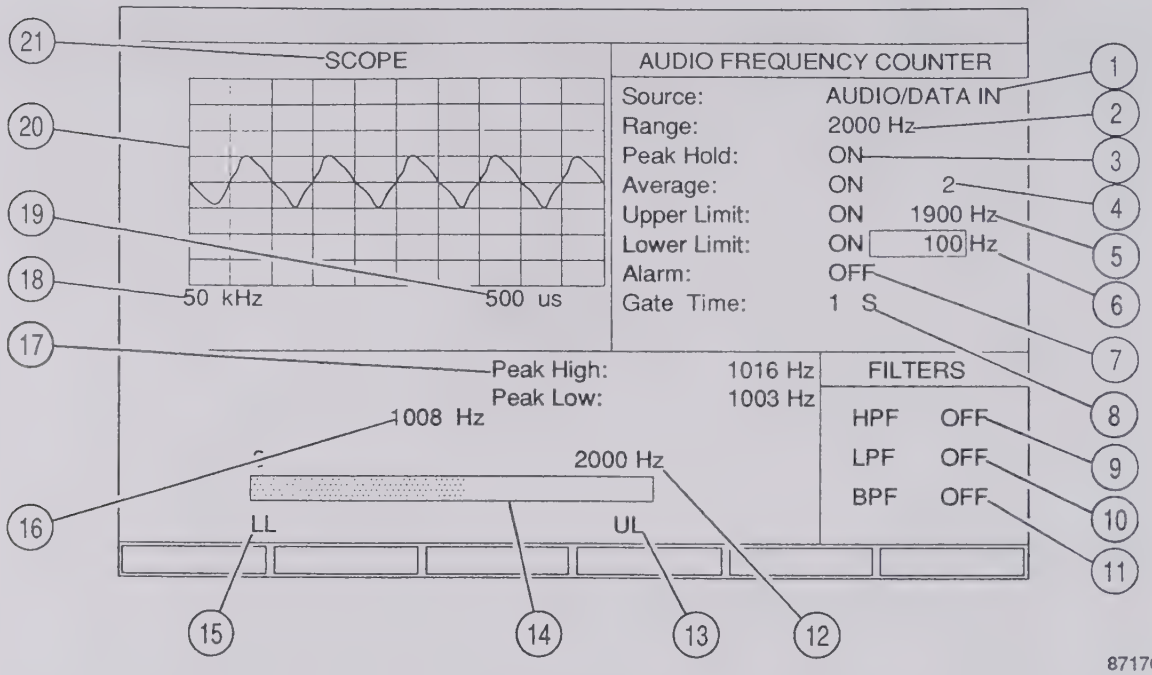


Figure 3-11 Meters Menu

Section	Title	Page
A.	Audio Frequency Counter	3-202
B.	SINAD Meter	3-208
C.	Digital Voltmeter	3-214
D.	Distortion Meter	3-219

A. AUDIO FREQUENCY COUNTER

The Audio Frequency (AF) Counter counts the audio signal that is supplied at the indicated Source. Information provided is displayed as follows:



8717095

ITEM	DESCRIPTION

1. Source

Displays input source for Audio Frequency Counter. Sources include AUDIO/DATA IN Connector (AUD/DAT), RF Power Meter input line (RF POW), EXT MOD Connector (EXT MOD) and SCOPE/DVM Connector (SC/DVM).

Soft Function Keys available include:

F1 AUD/DAT
Selects AUDIO/DATA IN Connector as input source for meter.

F2 RF POW
Selects RF Power Meter input line as input source for meter.

F3 EXT MOD
Selects EXT MOD Connector as input source for meter.

F4 SC/DVM
Selects SCOPE/DVM Connector as input source for meter.

F5 RST PK
Resets Peak Hold Function.

F6 Returns Test Set to Meters Menu.

2. Range

Displays Upper Range. Selections include Autorange, 200 Hz, 2000 Hz and 20 kHz.

Soft Function Keys available include:

F1 200 Hz
Selects 200 Hz for current Range.

F2 2000 Hz
Selects 2 kHz for current Range.

F3 20 kHz
Selects 20 kHz for current Range.

F4 AUTO
Sets Meter to Autorange.

F5 RST PK
Resets Peak Hold Function.

F6 RETURN
Returns Test Set to Meters Menu.

3. Peak Hold

Displays current status of Peak Hold function. Displays OFF or ON.

Soft Function Keys available include:

F1 OFF/ON
Toggles Peak Hold Function ON and OFF.

F5 RST PK
Resets Peak Hold Function.

F6 RETURN
Returns Test Set to Meters Menu.

4. Average

Displays Averaging Function status and number of samples when active. Status is OFF or ON. Range is 2 to 10.

Soft Function Keys available include:

F1 OFF/ON
Toggles Average Function ON and OFF.

F5 RST PK
Resets Peak Hold Function.

F6 RETURN
Returns Test Set to Meters Menu.

5. Upper Limit

Displays current status of Upper Limit Function and Upper Limit value when active. Status is OFF or ON. Range of value is 0 to 20000 Hz.

Soft Function Keys available include:

F1 OFF/ON
Toggles Upper Limit Function ON and OFF.

F5 RST PK
Resets Peak Hold Function.

F6 RETURN
Returns Test Set to Meters Menu.

6. Lower Limit

Displays current status of Lower Limit Function and Lower Limit value when active. Status is OFF or ON. Range of value is 0 to 20000 Hz.

Soft Function Keys available include:

F1 OFF/ON
Toggles Lower Limit Function On and Off.

F5 RST PK
Resets Peak Hold Function.

F6 RETURN
Returns Test Set to Meters Menu.

7. Alarm

Displays current status of Alarm Function. Status is OFF or ON. When ON, Alarm sounds when signal exceeds Upper Limit (5) or is below Lower Limit (6).

Soft Function Keys available include:

F1 OFF/ON
Toggles Alarm Function ON and OFF.

F5 RST PK
Resets Peak Hold Function.

F6 RETURN
Returns Test Set to Meters Menu.

8. Gate Time

Displays Gate Time for reading signal frequency. Selections include 1 and 10 sec. 1 sec Gate Time reads faster and is less accurate than 10 sec Gate Time.

Soft Function Keys available include:

F1 1 S
Selects 1 second Gate Time.

F2 10 S
Selects 10 seconds Gate Time.

F5 RST PK
Resets Peak Hold Function.

F6 RETURN
Returns Test Set to Meters Menu.

9. High-Pass Filter (HPF)

Displays selected Highpass Filter setting. Selections include 4 kHz, 300 Hz and OFF.

NOTE: High-Pass/Low-Pass Filter combination and Bandpass filter cannot be active simultaneously.

Soft Function Keys available include:

F1 OFF
Sets High-Pass Filter to OFF, deactivating all high-pass filters.

F2 300 Hz
Activates 300 Hz High-Pass Filter.

F3 4 kHz
Activates 4 kHz High-Pass Filter.

F6 RETURN
Returns Test Set to Meters Menu.

10. Low-Pass Filter (LPF)

Displays current Low-Pass Filter setting. Selections include OFF, 300 Hz, 4 kHz and 20 kHz.

NOTE: High-Pass/Low-Pass Filter combination and Bandpass filter cannot be active simultaneously.

Soft Function Keys available include:

F1 OFF
Sets Low-Pass Filter to OFF, deactivating all low-pass filters.

F2 300 Hz
Activates 300 Hz Low-Pass Filter.

F3 4 kHz
Activates 4 kHz Low-Pass Filter.

F4 20 kHz
Activates 20 kHz Low-Pass Filter.

F6 RETURN
Returns Test Set to Meters Menu.

11. Bandpass Filter (BPF)

Displays current Bandpass Filter setting. Selections include C-Message Weighted Filter and OFF.

NOTE: High-Pass Filter/Low-Pass Filter combination and Bandpass filter cannot be active simultaneously.

Soft Function Keys available include:

F1 OFF
Sets Bandpass Filter to OFF, deactivating all bandpass filters.

F1 C-MSG
Activates C-Message Weighted Bandpass Filter.

F6 RETURN
Returns Test Set to Meters Menu.

12. Upper Range Limit Readout

Displays current value of Range (2). Redefined as needed if Autorange is active.

13. Upper Limit Bar

Indicates position of Upper Limit (5) on Bar Meter (14). If Upper Limit (5) exceeds Range (2), marker is not visible.

14. Bar Meter

Relative Graphic display of current Meter reading.

15. Upper Limit Bar

Indicates position of Lower Limit (6) on Bar Meter (14). If Upper Limit (10) exceeds Range (2), marker is not visible.

16. Frequency Reading

Displays current Audio Frequency of demodulated signal in Hz.

17. Peak Readings

Displays current high and low Peak readings when Peak Hold (3) is set to ON. Readings are reinitialized when RST PK Soft Function Key F5 is pressed.

18. Scope Scale

Displays selected scale for Oscilloscope. Selections change depending on selected Source (1). Selections include:

Source (1)	Scale
AUD/DAT	0.02, 0.04, 0.10, 0.20, 0.40, 1.00
RF POW	LOW (2 mW to 20 mW signal) MED (>20 mW to 2 W signal) HIGH (>2 W to 200 W signal)
EXT MOD	100, 200, 500 mV/Div, 1, 2, 5 V/Div
SCP/DVM	10, 20, 50, 100, 200, 500 mV/Div 1, 2, 5, 10, 20, 50 V/Div

Soft Function Keys available include:

F1 MENU
Displays selections for Scope Scale. Soft Function Keys available include:

F6 RETURN
Returns Test Set to normal AF Counter Operation.

19. Scope Sweep

Displays selected Oscilloscope Sweep time per division. Selections include:

100 µs/Div	200 µs/Div	500 µs/Div
1 ms/Div	2 ms/Div	5 ms/Div
10 ms/Div	20 ms/Div	50 ms/Div
100 ms/Div		

Soft Function Keys available include:

F6 RETURN
Exits Menu into normal operation.

20. SCOPE Screen

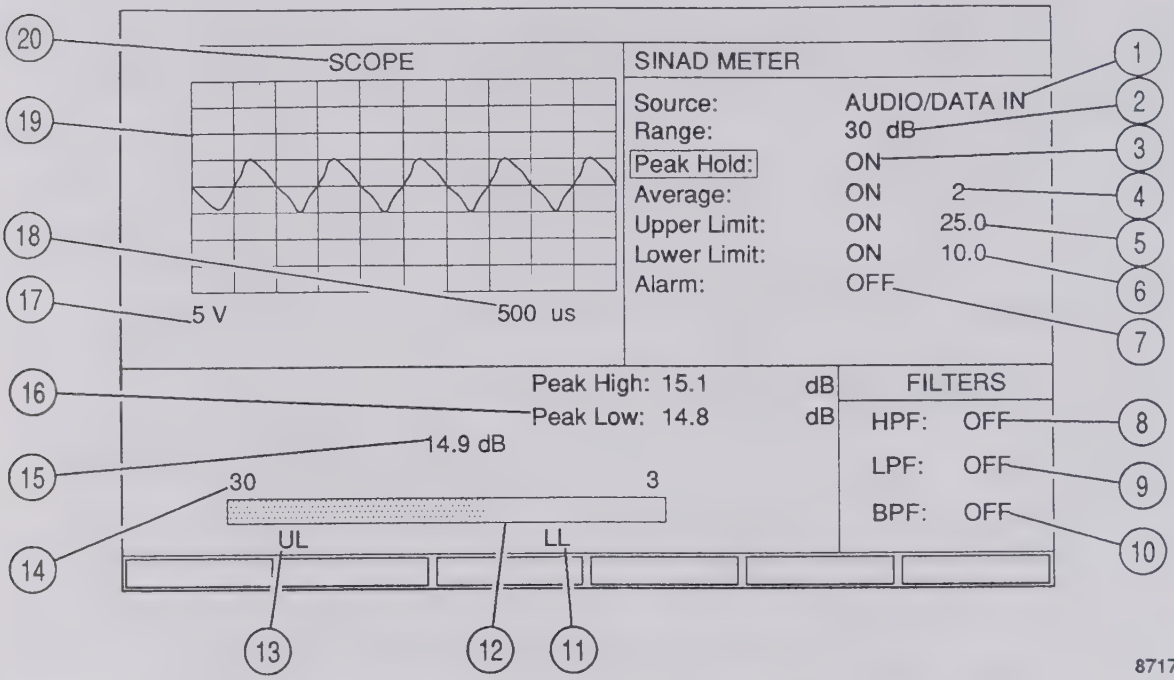
Displays digitized trace of specified signal.

21. SCOPE Prompt

Displays current operation function.

B. SINAD METER

The SINAD Meter determines SINAD for a 1 kHz tone passed to the COM-120A through the specified Source. Information provided the user is displayed below:



ITEM	DESCRIPTION

1. Source

Displays selected source for SINAD Meter. Selections include AUDIO/DATA IN Connector and Scope/DVM Connector.

Soft Function Keys available include:

F1 AUD/DAT
Selects AUDIO/DATA IN Connector as Source for SINAD Meter.

F2 SCP/DVM
Selects Scope/DVM Connector as Source for SINAD Meter.

F5 RST PK
Resets Peak Hold Function.

F6 RETURN
Returns Test Set to Meters Menu.

2. Range

Displays selected SINAD Meter Upper Range. Selections include Autorange, 15 dB and 30 dB.

Soft Function Keys available include:

F1 15 dB
Selects 15 dB as active upper range for SINAD Meter.

F2 30 dB
Selects 30 dB as active upper range for SINAD Meter.

F3 AUTO
Selects Autorange as active upper range for SINAD Meter. This setting will automatically adjust to a higher or lower upper range if signal increases or decreases to a specified level of the current setting.

F5 RST PK
Resets Peak Readings displayed to 0.

F6 RETURN
Returns Test Set to Meters Menu.

3. Peak Hold

Displays current status of Peak Hold function. Displays OFF or ON.

Soft Function Keys available include:

F1 OFF/ON
Toggles Peak Hold Function On and Off.

F5 RST PK
Resets Peak Hold Function.

F6 RETURN
Returns Test Set to Meters Menu.

4. Average

Displays current status of Averaging Function and number of samples when active. Status is Off or On. Range of samples is 2 to 10.

Soft Function Keys available include:

F1 OFF/ON
Toggles Average Function On and Off.

F5 RST PK
Resets Peak Hold Function.

Soft Function Keys available include:

F1 OFF
Sets Bandpass Filter to OFF, deactivating all bandpass filters.

F1 C-MSG
Activates C-Message Weighted Bandpass Filter.

F6 RETURN
Returns Test Set to Meters Menu.

11. Lower Limit Bar

Indicates position of Lower Limit (6) on Bar Meter (12). If LOWER LIMIT (6) exceeds RANGE (2), marker is not visible.

12. Bar Meter

Relative Graphic display of current SINAD Meter reading.

13. Upper Limit Bar

Indicates position of Upper Limit (5) on Bar Meter (12). If Upper Limit (5) exceeds RANGE (2), marker is not visible.

14. Upper Range Limit Readout

Displays current value of Range (2). Redefined as needed if Autorange function is active.

15. Digital Readout

Displays current SINAD Meter Reading.

16. Peak Readings

Displays current high and low Peak Readings when Peak Hold (3) is set to ON. Readings are reinitialized when RST PK Soft Function Key F5 is pressed.

17. Scope Scale

Displays selected scale for Oscilloscope. Selections change depending on selected Source (1). Selections include:

Source (1)	Scale
AUD/DAT	100, 200, 500 mV, 1, 2, 5 V
SC/DVM	10, 20, 50, 100, 200, 500 mV/Div 1, 2, 5, 10, 20, 50 V/Div

Soft Function Keys available include:

F1 MENU
Displays selections for Oscilloscope Scale. Soft Function Keys available include:

F6 RETURN
Returns Test Set to normal operation.

18. Scope Sweep

Displays selected Oscilloscope Sweep time per division. Selections include:

100 µs/Div	200 µs/Div	500 µs/Div
1 ms/Div	2 ms/Div	5 ms/Div
10 ms/Div	20 ms/Div	50 ms/Div
100 ms/Div		

Soft Function Keys available include:

F1 MENU
Displays selections for Oscilloscope Sweep. Soft Function Keys available include:

F6 RETURN
Exits Menu into normal operation.

19. SCOPE Screen

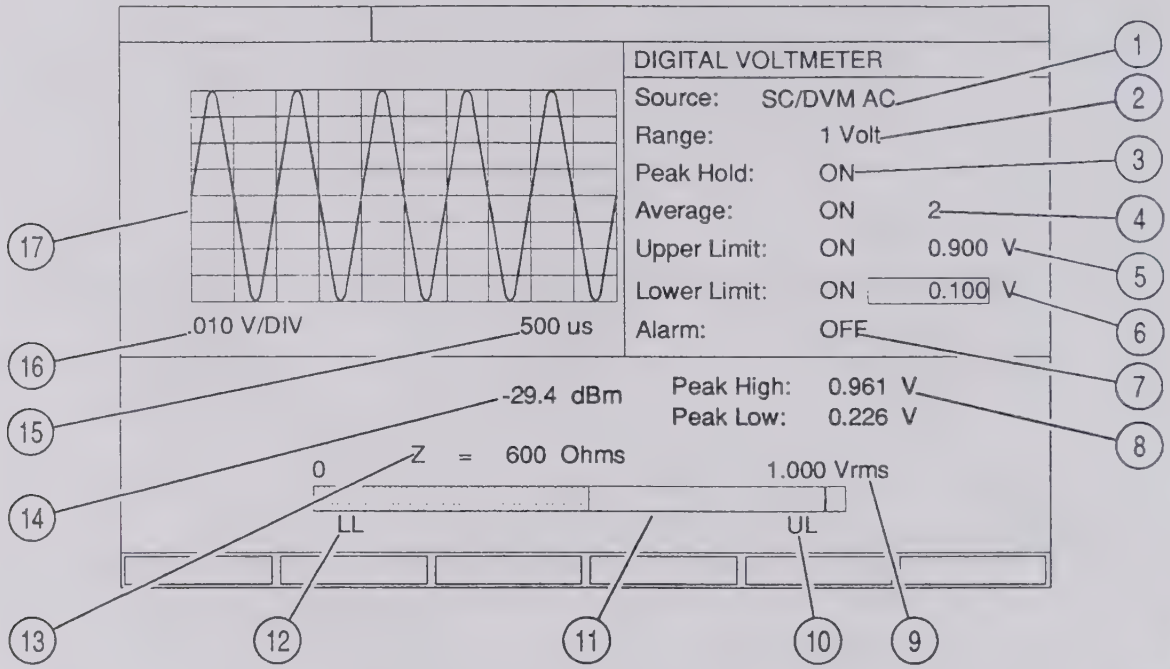
Displays digitized trace of specified signal.

20. SCOPE Prompt

Displays current operation function.

C. DIGITAL VOLTMETER

The Digital Voltmeter (DVM) measures voltage at the indicated Source. Units that are used are dependent on the selected Source (1). Information provided is displayed as follows:



8717012

ITEM	DESCRIPTION

1. Source

Displays selected source for SINAD Meter. Selections include the following:

SCOPE/DVM Connector DC Coupled (SC/DVM DC)
SCOPE/DVM Connector AC Coupled (SC/DVM AC)
SCOPE/DVM Connector GND Coupled (SC/DVM GND)
AUDIO/DATA IN Connector (AUDIO/DATA IN)
EXT MOD IN Connector (EXT MOD IN)

Soft Function Keys available include:

F1 MENU
Displays selections for DVM Source.

F6 RETURN
Returns Test Set to normal operation.

F3 DC ZERO
Zeroes reading to indicate 0 Vdc reading.

F5 RST PK
Resets Peak Hold Function.

F6 RETURN
Returns Test Set to Meters Menu.

2. Range

Displays selected DVM Upper Range. Selections include:

50 mV/Div	100 mV/Div	200 mV/Div
500 mV/Div	1 V/Div	2 V/Div
5 V/Div	10 V/Div	20 V/Div
50 V/Div	100 V/Div	200 V/Div

Soft Function Keys available include:

F1 MENU
Displays selections for DVM Range. Soft Function Keys available with this function include:

F6 RETURN
Returns Test Set to normal operation.

F5 RST PK
Resets Peak Readings displayed.

F6 RETURN
Returns Test Set to Meters Menu.

3. Peak Hold

Displays current status of Peak Hold function. Displays OFF or ON.

Soft Function Keys available include:

F1 OFF/ON
Toggles Peak Hold Function ON and OFF.

F5 RST PK
Resets Peak Hold Function.

F6 RETURN
Returns Test Set to Meters Menu.

4. Average

Displays current status of Averaging Function and number of samples when active. Status is Off or On. Range is 2 to 10.

Soft Function Keys available with this function include:

F1 OFF/ON
Toggles Average Function ON and OFF.

F5 RST PK
Resets Peak Hold Function.

F6 RETURN
Returns Test Set to Meters Menu.

5. Upper Limit

Displays current status of Upper Limit Function and Upper Limit value when active. Status is OFF or ON. Range of value is 0 to 200 Volts.

Soft Function Keys available include:

F1 OFF/ON
Toggles Upper Limit Function ON and OFF.

F5 RST PK
Resets Peak Hold Function.

F6 RETURN
Returns Test Set to Meters Menu.

6. Lower Limit

Displays current status of Lower Limit Function and Lower Limit value when active. Status is OFF or ON. Range of value is 0 to 200 Volts.

Soft Function Keys available include:

F1 OFF/ON
Toggles Lower Limit Function ON and OFF.

F5 RST PK
Resets Peak Hold Function.

F6 RETURN
Returns Test Set to Meters Menu.

7. ALARM

Displays current status of Alarm Function. Status is OFF or ON. When ON, alarm sounds when signal exceeds Upper Limit (5) or is below Lower Limit (6).

Soft Function Keys available include:

F1 OFF/ON
Toggles Alarm Function ON and OFF.

F5 RST PK
Resets Peak Hold Function.

F6 RETURN
Returns Test Set to Meters Menu.

8. Peak Readings

Displays current high and low Peak Readings when Peak Hold (3) is set to ON. Readings are reinitialized whenever RST PK Soft Function Key F5 is pressed.

9 Upper Range Limit Readout

Displays value of Range (2). Units are redefined as needed to match Source (1).

10. Upper Limit Bar

Indicates position of Upper Limit (5) on Bar Meter (11). If Upper Limit (5) exceeds Range (2), marker is not visible.

11. Bar Meter

Relative Graphic display of current Meter reading.

12. Upper Limit Bar

Indicates position of Lower Limit (6) on Bar Meter (11). If Lower Limit (6) exceeds Range (2), marker is not visible.

13. Impedance

Sets impedance of input signal for measuring Reading (14) in dBm. Not visible with Reading (14) set for other units. Range is 2 to 1000 W.

14. Reading

Displays current Reading in units specified by Source (1). Units for SC/DVM DC and SC/DVM GND are Volts; all other Sources (1) are Vrms, dB or dBm. Reading in dBm is referenced to Impedance (13).

Soft Function Keys available with ac-coupled sources include:

F1 Vrms
Selects Vrms for Reading Units.

F2 dBm
Selects dBm for Reading Units. Activates Impedance field.

F3 dB
Selects dB for Reading Units.

F6 RETURN
Returns Test Set to Meters Menu.

15. Oscilloscope Sweep

Displays selected Oscilloscope Sweep time per division. Selections include:

100 µs/Div	200 µs/Div	500µs/Div
1 ms/Div	2 ms/Div	5 ms/Div
10 ms/Div	20 ms/Div	50 ms/Div
100 ms/Div		

Soft Function Keys available include:

F1 MENU
Displays selections for Sweep. Soft Function Keys available include:

F6 RETURN
Exits Menu into normal operation.

15. Oscilloscope Scale

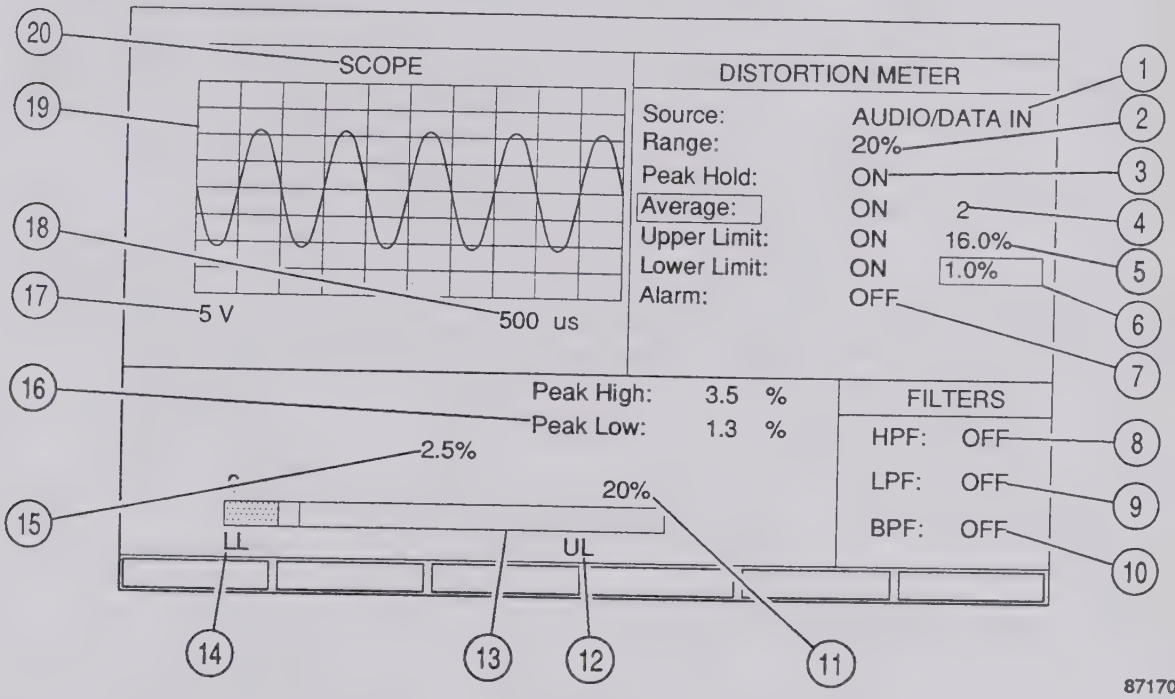
Displays Oscilloscope Vertical Scale. Scale is changed when Range is changed.

16. Oscilloscope Screen

Displays digitized trace of specified signal.

D. DISTORTION METER

The Distortion Meter determines Distortion for a 1 kHz tone passed to the COM-120A through the specified Source. Information provided the user is displayed below:



8717096

ITEM	DESCRIPTION

1. Source

Displays selected source for Distortion Meter. Selections include AUDIO/DATA IN Connector and SCOPE/DVM Connector.

Soft Function Keys available include:

F1 AUD/DAT
Selects AUDIO/DATA IN Connector as Source for Distortion Meter.

F2 SCP/DVM
Selects SCOPE/DVM Connector as Source for Distortion Meter.

F5 RST PK
Resets Peak Hold Function.

F6 RETURN
Returns Test Set to Meters Menu.

2. Range

Displays Distortion Meter Upper Range of 20%. Field is for display only.

3. Peak Hold

Displays current status of Peak Hold function. Displays OFF or ON.

Soft Function Keys available include:

F1 OFF/ON
Toggles Peak Hold Function ON and OFF.

F5 RST PK
Resets Peak Hold Function.

F6 RETURN
Returns Test Set to Meters Menu.

4. Average

Displays current status of Averaging Function and number of samples when active. Status is OFF or ON. Range of samples is 2 to 10.

Soft Function Keys available include:

F1 OFF/ON
Toggles Average Function ON and OFF.

F5 RST PK
Resets Peak Hold Function.

F6 RETURN
Returns Test Set to Meters Menu.

5. Upper Limit

Displays current status of Upper Limit Function and Upper Limit value when active. Status is OFF or ON. Range of value is 0% to 20%.

Soft Function Keys available include:

F1 OFF/ON
Toggles Upper Limit Function ON and OFF.

F5 RST PK
Resets Peak Hold Function.

F6 RETURN
Returns Test Set to Meters Menu.

6. Lower Limit

Displays current status of Lower Limit Function and Lower Limit value when active. Status is OFF or ON. Range of value is 0% to 20%.

Soft Function Keys available include:

F1 OFF/ON
Toggles Lower Limit Function ON and OFF.

F5 RST PK
Resets Peak Hold Function.

F6 RETURN
Returns Test Set to Meters Menu.

7. Alarm

Displays current status of Alarm Function. Status is OFF or ON. When ON, Audible alarm sounds when signal exceeds Upper Limit (5) or is below Lower Limit (6).

Soft Function Keys available include:

F1 OFF/ON
Toggles Alarm Function On and Off.

F5 RST PK
Resets Peak Hold Function.

F6 RETURN
Returns Test Set to Meters Menu.

8. High-Pass Filter (HPF)

Displays current High-Pass Filter setting.

NOTE: High-Pass Filter/Low-Pass Filter combination and Bandpass filter cannot be active simultaneously.

Soft Function Keys available include:

F1 OFF
Sets High-Pass Filter to OFF, deactivating all high-pass filters.

F2 300 Hz
Activates 300 Hz High-Pass Filter.

F3 4 kHz
Activates 4 kHz High-Pass Filter.

F6 RETURN
Returns Test Set to Meters Menu.

9. Low-Pass Filter (LPF)

Displays current Low-Pass Filter setting.

NOTE: High-Pass Filter/Low-Pass Filter combination and Bandpass filter cannot be active simultaneously.

Soft Function Keys Available with this function include:

F1 OFF
Sets Low-Pass Filter to OFF, deactivating all low-pass filters.

F2 300 Hz
Activates 300 Hz Low-Pass Filter.

F3 4 kHz
Activates 4 kHz Low-Pass Filter.

F4 20 kHz
Activates 20 kHz Low-Pass Filter.

F6 RETURN
Returns Test Set to Meters Menu.

10. Bandpass Filter (BPF)

Displays current Bandpass Filter setting.

NOTE: High-Pass Filter/Low-Pass Filter combination and Bandpass filter cannot be active simultaneously.

Soft Function Keys Available with this function include:

F1 OFF
Sets Bandpass Filter to OFF, deactivating all bandpass filters.

F1 C-MSG
Activates C-Message Weighted Bandbass Filter.

F6 RETURN
Returns Test Set to Meters Menu.

11. Upper Range Limit Readout

Displays current value of RANGE (2). Redefined as needed if Autorange function is active.

12. Upper Limit Bar

Indicates position of UPPER LIMIT (5) on Bar Meter (13). If UPPER LIMIT (5) exceeds RANGE (2), marker is not visible.

13. Bar Meter

Relative Graphic display of current Distortion Meter reading.

14. Lower Limit Bar

Indicates position of Lower Limit (6) on Bar Meter (13). If Lower Limit (6) exceeds Range (2), marker is not visible.

15. Digital Readout

Displays current Distortion Meter Reading.

16. Peak Readings

Displays current high and low Peak readings when Peak Hold (3) is set to ON. Readings are reinitialized when RST PK Soft Function Key F5 is pressed.

17. Scope Scale

Displays selected scale for Oscilloscope. Selections change depending on selected Source (1). Selections include:

Source (1)	Scale
AUD/DAT	100, 200, 500 mV, 1, 2, 5 V
SC/DVM	10, 20, 50, 100, 200, 500 mV/Div 1, 2, 5, 10, 20, 50 V/Div

Soft Function Keys available include:

F1 MENU
Displays selections for Scope Scale. Soft Function Keys available include:

F6 RETURN
Returns Test Set to normal operation.

18. Scope Sweep

Displays selected Oscilloscope Sweep time per division. Selections include:

100 µs/Div	200 µs/Div	500 µs/Div
1 ms/Div	2 ms/Div	5 ms/Div
10 ms/Div	20 ms/Div	50 ms/Div
100 ms/Div		

Soft Function Keys available include:

F1 MENU
Displays selections for Oscilloscope Sweep. Soft Function Keys available include:

F6 RETURN
Exits Menu into normal operation.

19. SCOPE Screen

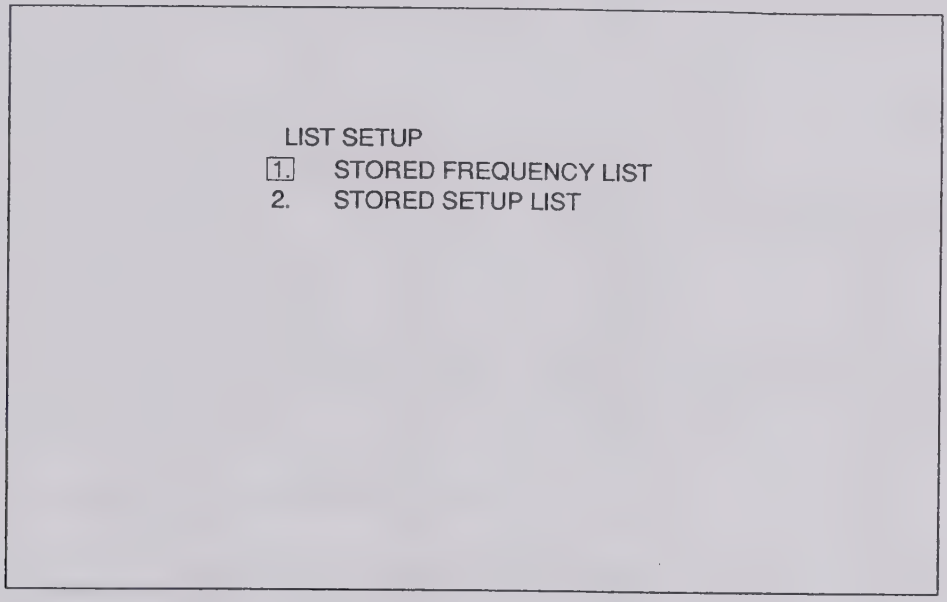
Displays digitized trace of specified signal.

20. SCOPE Prompt

Displays current operation function.

3-3-8 MEMORY LISTS AND STORAGE OF PARAMETERS

The COM-120A offers two ways to use memory to store parameters. First, the operator can make a Frequency List, specifying a frequency for Generating, a frequency for Receiving and an Offset for Duplex. Secondly, the user can store all parameters of RF Generate, RF Receive and Duplex Operation Screens, including supporting meters and operation screens in a Setup List. These Lists are accessable from a List Setup Screen shown in Figure 3-12. The List Setup Screen can be accessed by pressing the SHOW LIST Memory Key.



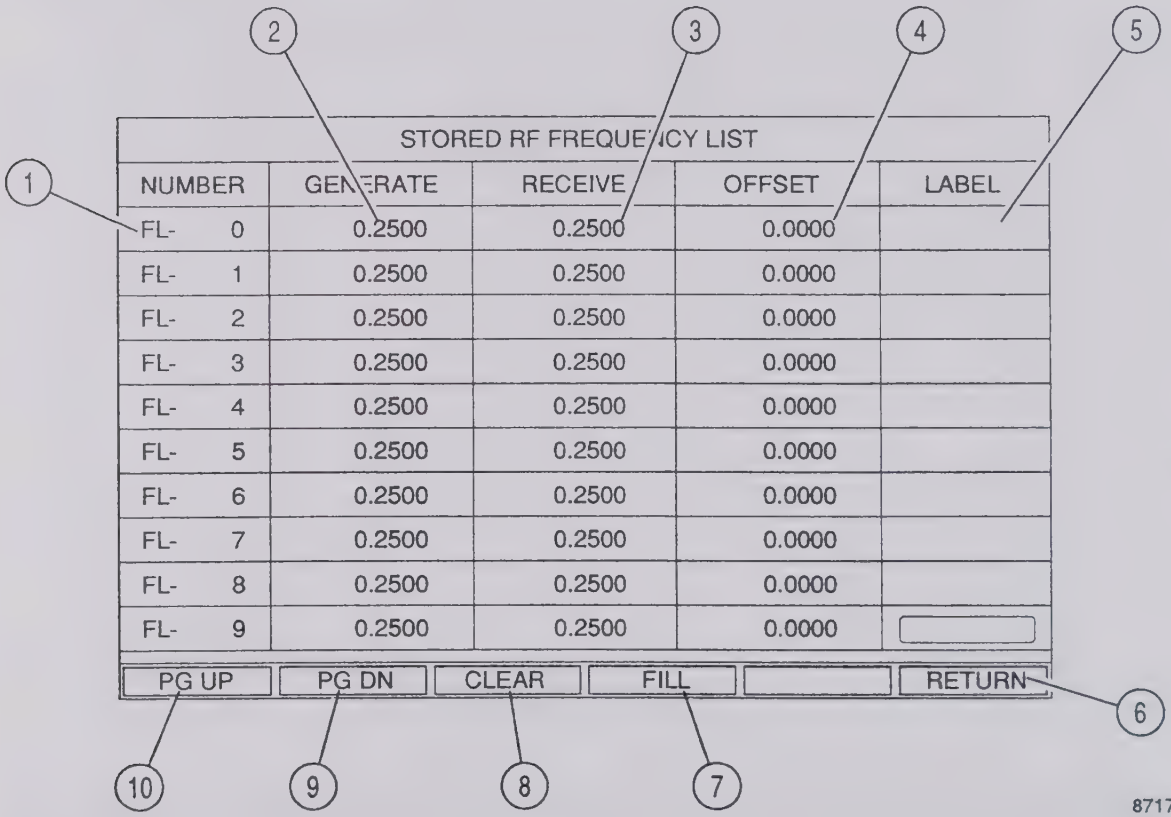
8718018

Figure 3-12 List Setup Menu

From the List Setup Menu, the Stored Frequency List and the Stored Setup List can be accessed by placing cursor on desired location and pressing ENTER Key. Refer to para 3-3-8(A) for information on the Stored Frequency List and to para 3-3-8(B) for information on the Stored Setup List.

A. STORED FREQUENCY LIST

Accessing the Stored Frequency List accesses a screen similar to the following. All edits to the Frequency List are made from this screen. The cursor can move to any frequency or label field. Up to 100 Frequency List entries (0-99) can be used for entering a Generate frequency, a Receive frequency and a Duplex Offset. Accessing a Frequency List Parameter from the RF Generate Operation Screen affects only that screen. The same is true for the RF Receive Operation Screen. Accessing a Frequency List Parameter from any Duplex Operation Screen activates the Generate Frequency, the Receive Frequency and the Offset. Whenever used, the Label also is activated for any Operation Screen. Features and Editable Parameters of the Stored Frequency List are as follows:



ITEM	DESCRIPTION

1. Frequency List Number

   Displays Frequency List Number used to identify specified Generate Frequency (2), Receive Frequency (3) and Offset (4). Frequency List Numbers available include 0 to 99 with 10 displayed.

2. Generate Frequency

   Displays Generate Frequency. Selections range from 0.2500 to 1000.0000 MHz.

ITEM	DESCRIPTION

3. Receive Frequency

   Displays Receive Frequency. Selections range from 0.2500 to 1000.0000 MHz.

4. Offset

   Displays Duplex Offset. Selections range from 0.0000 to 999.7500 MHz.

5. Label

   Displays optional Label associated with current Frequency List. Label consists of seven characters maximum.

6. RETURN Soft Function Key F6

   Returns COM-120A to List Setup Menu.

7. FILL Soft Function Key F4

   Accesses window for setting Fill range. Pressing EXEC Soft Function Key F5 Fills specified range of Offset Column with value where cursor is located. Visible only with cursor located on Offset (4). Pressing ESCAPE Soft Function Key F6 escapes edit without change.

   Soft Function Keys available include:

   F5 EXEC
   Executes Fill Function over specified range.

   F6 ESCAPE
   Escapes edit without change.

8. CLEAR Soft Function Key F3

   Clears label location where cursor is located. Visible only with cursor located on Label (5).

9. PG DN Soft Function Key F2

   Pages down to next page of Frequency List.

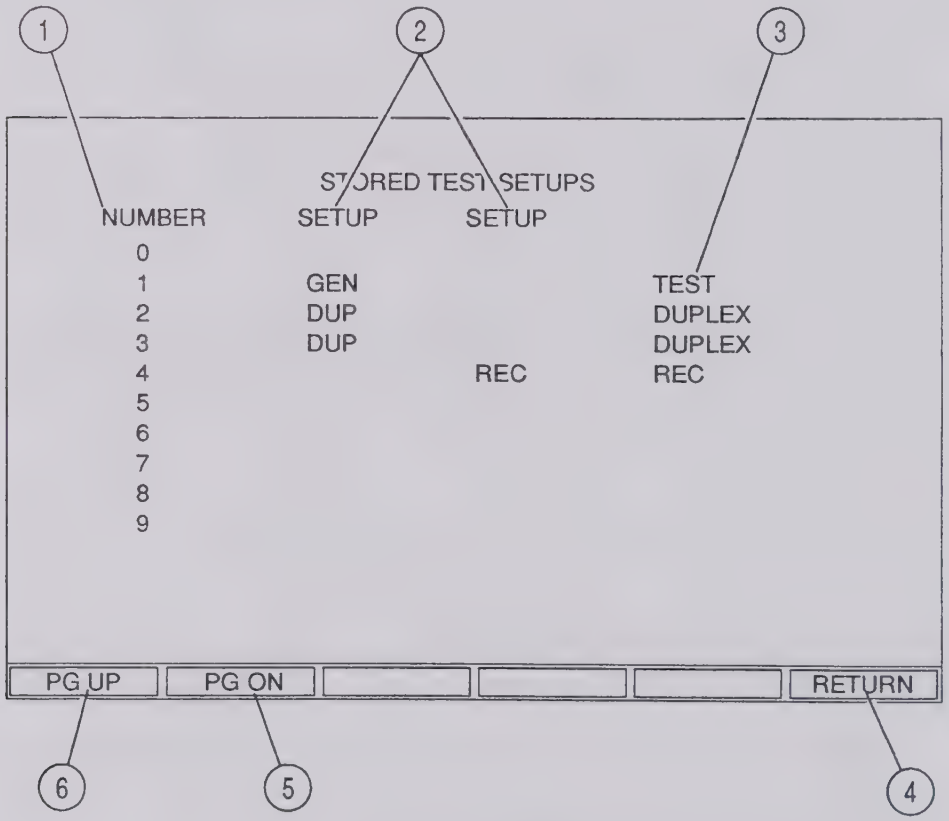
10. PG UP Soft Function Key F1

    Pages up to previous page of Frequency List.

B. STORED SETUP LIST

Accessing the Stored Setup List displays a screen similar to the following. No edits to the Stored Setup List are made from this screen. The Stored Setup List displays Stored Setups by List Number Setup Type and an optional Label. Up to 49 Setups can be stored of RF Generate Operation Screen, RF Receive Operation Screen or the Duplex Operation Screens. Parameters of the Operation Screens and all selected meters are stored for future recall. For information on Store and Recall Operations, refer to para 3-3-1(I), RF Generate Operation Screen, 3-3-2(0), RF Receive Operation Screen or 3-3-3(D), Duplex Operation Screen.

Features of the Stored Setup List are as follows:



8717097

ITEM	DESCRIPTION

1. Setup List Number

   Displays Setup List Number used to identify specified Setup Type (2) and Label (3). Frequency List Numbers available include 0 to 49 with 10 displayed.

2. Setup Type

   Displays operation type stored at specified location. Selections include GEN (RF Generate Operation Screen), DUP (Duplex Operation Screen) and REC (RF Receive Operation Screen).

ITEM	DESCRIPTION

3. Label

   Displays optional Label associated with Setup. Label can consist of seven characters maximum.

4. RETURN Soft Function Key F6

   Returns COM-120A to List Setup Menu.

5. PG DN Soft Function Key F2

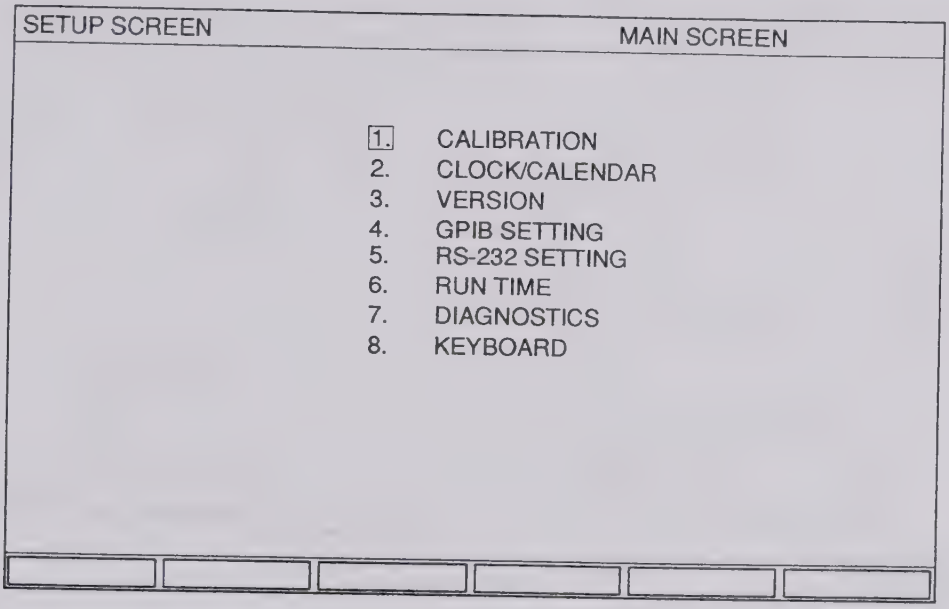
   Pages down to next page of Stored Setup List.

6. PG UP Soft Function Key F1

   Pages up to next page of Stored Setup List.

3-3-9 UTILITY FUNCTIONS

The Setup Screen shown in Figure 3-13 allows access to system configuration and provides information on system status. The Setup Screen is accessed by pressing SETUP Memory Key. Selections are made by placing cursor on desired subject and pressing the ENTER Key.



8717028

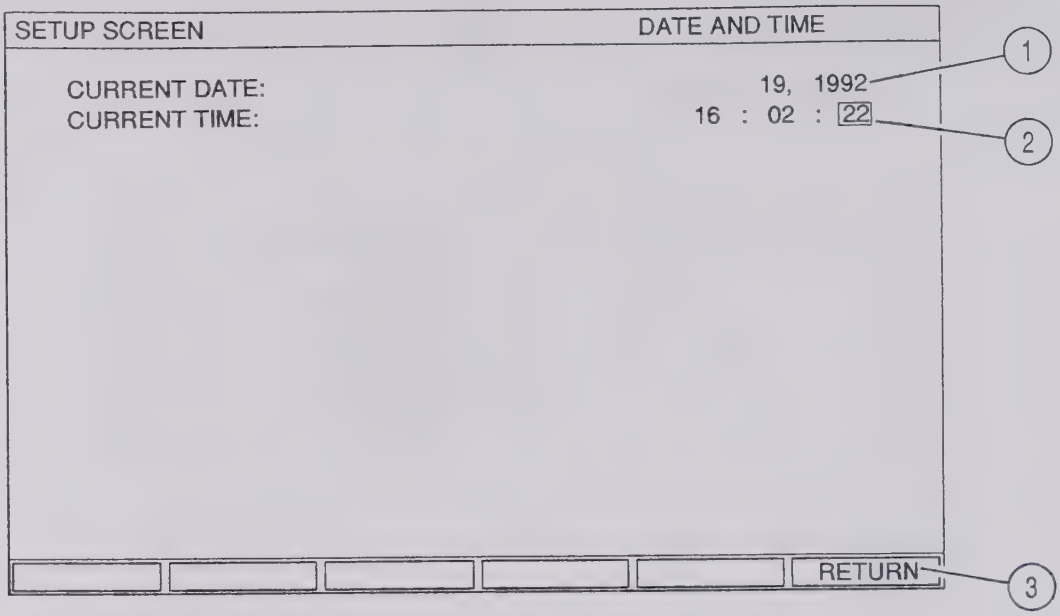
Figure 3-13 Setup Screen

Each of the selections of the Setup Screen access another screen for performing the required function. The Calibration selection is under password security and is not covered in this manual. The other selections are covered in the following sections:

Section	Title	Page
A.	Clock/Calender Screen	3-232
B.	Software Version Screen	3-233
C.	GPIB Configuration Screen (Option 13)	3-234
D.	RS-232 Configuration Screen	3-235
E.	Run Time Screen	3-237
F.	System Diagnostics Menu	3-238
G.	Keyboard Setup Screen	3-240

A. CLOCK/CALENDER SCREEN

The Clock/Calender Screen is used to set the Date and Time for the COM-120A. Features and editable parameters are shown below.



8717031

ITEM	DESCRIPTION

1. Date Field

   Sets date in month, day and year format. Each section is edited separately.

2. Time Field

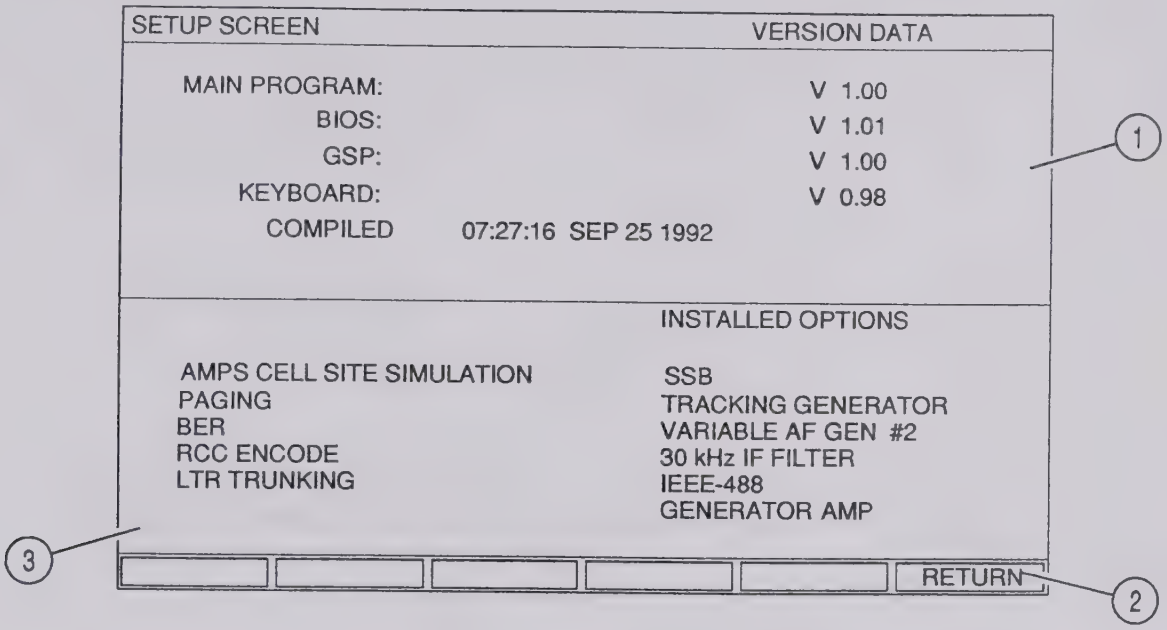
   Sets time in 24 hour format. Sets time in hours, minutes and seconds. Each section is edited separately.

3. RETURN Soft Function Key F6

   Returns operation to Setup Screen.

B. SOFTWARE VERSION SCREEN

The Software Version Screen is used to report the current version of programmed devices for the COM-120A as well as display installed options. Features and editable parameters are shown below.



8717032

ITEM	DESCRIPTION

1. Version Data

   Displays Software Version of the programmed devices in the COM-120A.

2. RETURN Soft Function Key F6

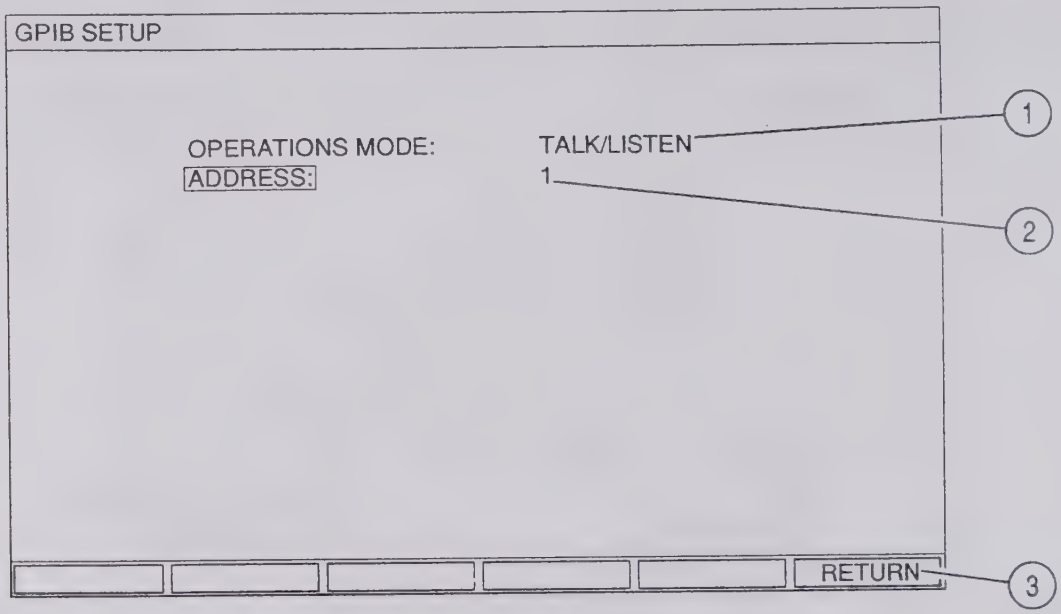
   Returns operation to Setup Screen.

3. Installed Options

   Displays list of options installed in unit.

C. GPIB CONFIGURATION SCREEN (OPTION 13)

The GPIB Configuration Screen is used to configure the GPIB Connector Protocol for the COM-120A. Features and editable parameters are shown below.



8717030

ITEM	DESCRIPTION

1. Operations Mode

   Displays selected Mode of Operation for GPIB Operation. Selections include TALK/LISTEN, TALK ONLY and LISTEN ONLY.

2. Address

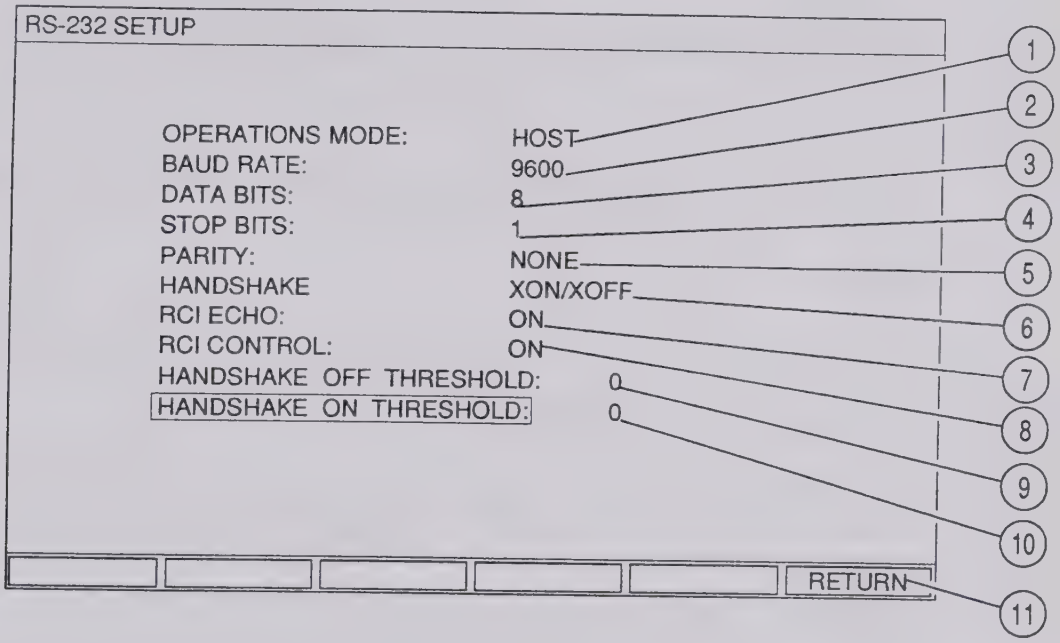
   Displays selected Address GPIB Operation. Selections range from 1 to 30.

3. RETURN Soft Function Key F6

   Returns operation to Setup Screen.

D. RS-232 CONFIGURATION SCREEN

The RS-232 Configuration Screen is used to configure the RS-232 Connector Protocol for the COM-120A. Features and editable parameters are shown below.



8717029

ITEM	DESCRIPTION

1. Operations Mode

   Displays selected Mode of Operation for RS-232 Operation. Selections include HOST and OFF.

2. BAUD RATE

   Selects BAUD Rate for data transfer through RS-232. Selections include:

110	150	300
600	1200	2400
4800	9600	19200
38400		

3. Data Bits

   Displays selected number of Data Bits. Selections include 7 and 8.

4. Stop Bits

   Displays selected number of Stop Bits. Selections include 1 and 2.

5. Parity Bits

   Displays selected Parity. Selections include NONE, EVEN and ODD.

6. Handshake

   Displays selected Handshake protocol. Selections include NONE, CTS, XON/XOFF and CTS/RTS.

7. RCI Echo

   Displays whether unit will echo characters back to remote control system over RS-232 interface. Displays ON or OFF.

8. RCI Control

   Displays whether unit will respond to commands from remote control system. Displays ON or OFF. This field controls both GPIB and RS-232 Remote Control.

9. HANDSHAKE OFF THRESHOLD

   Displays selected value used to "tune" remote interface for data transfer. RS-232 buffer is 255 bytes. When number of bytes remaining to fill buffer reaches selected value, Test Set will send Handshake Off signal. Value default is 25 and range is 10 to 240.

10. HANDSHAKE ON THRESHOLD

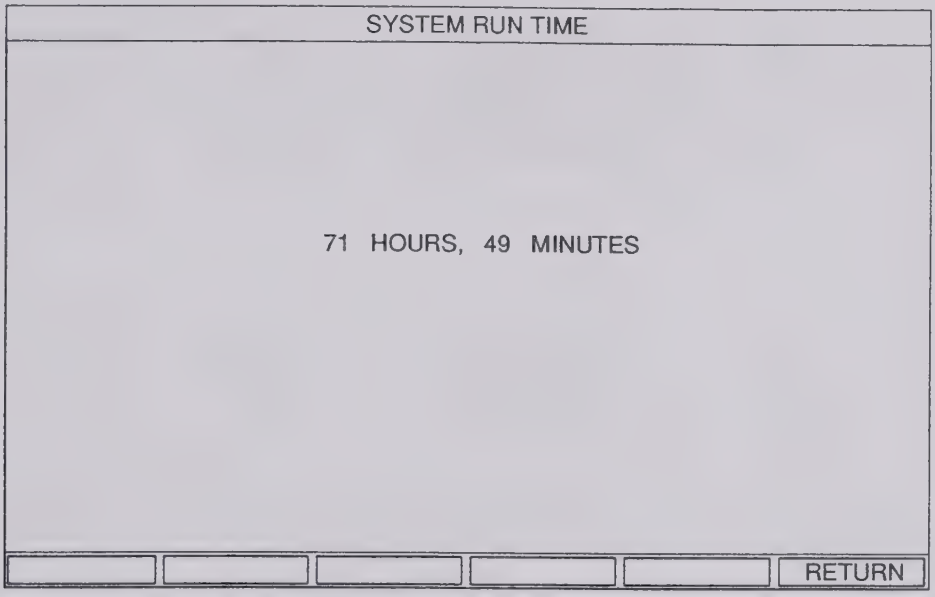
    Displays selected value used to "tune" remote interface for data transfer. When number of bytes remaining in buffer reaches selected value, Test Set will send Handshake On signal. Value default is 25 and range is 10 to 240.

11. RETURN Soft Function Key F6

    Returns operation to Setup Screen.

E. RUN TIME SCREEN

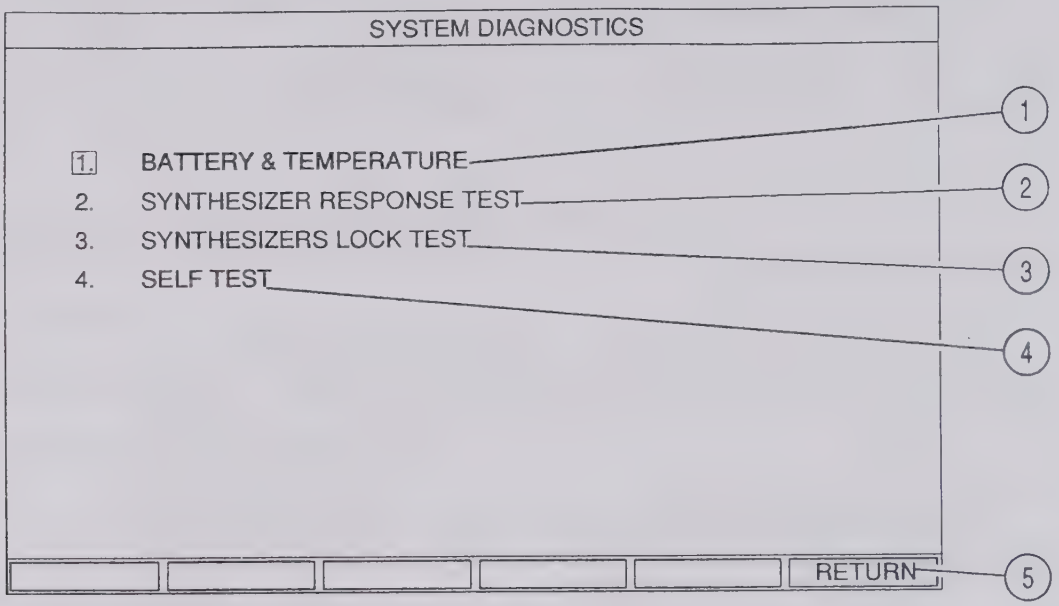
The Run Time Screen displays cumulative time spent in operation for the COM-120A. Time is displayed as shown below in Hours and Minutes. Pressing RETURN Soft Function Key F6 returns user to Setup Screen.



8717026

F. SYSTEM DIAGNOSTICS MENU

The System Diagnostics Menu displays a menu shown below for selecting a specific Diagnostics Screen:



8717027

ITEM	DESCRIPTION

1. Battery and Temperature

   Diagnostic Screen that Displays Battery voltage and Power Term Temperature.

2. Synthesizer Response Test

   Diagnostic Screen used to test Synthesizer Response.

3. Synthesizers Lock Test

   Diagnostic Screen used to display current status of synthesizers in the Test Set.

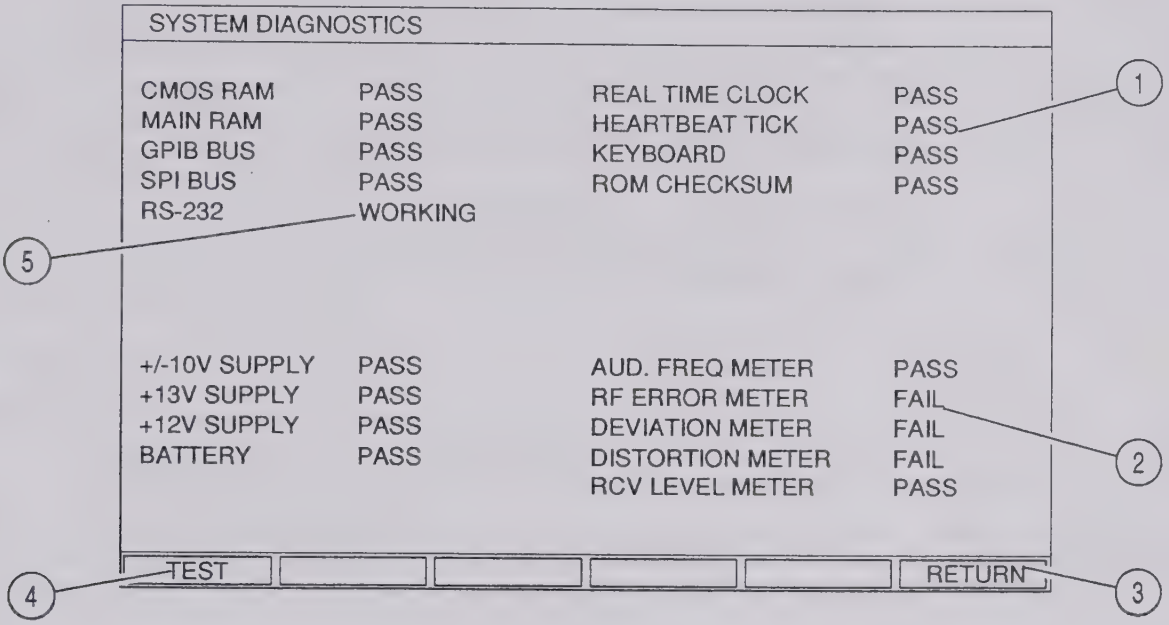
4. Self Test

   Diagnostic Screen for performing Self Test and reading results.

5. RETURN Soft Function Key F6

   Returns operation to Setup Screen.

Accessing Self Test Diagnostics Screen displays the following screen. Each test is listed with a PASS/FAIL Indicator beside it. Self Test is performed at turning power on and when TEST Soft Function Key F1 is pressed. Self Test features are:



8717019

ITEM	DESCRIPTION

1. PASS Indication

   Indicates test passed when Self Test was performed.

2. FAIL Indication

   Indicates test failed when Self Test was performed.

3. RETURN Soft Function Key F6

   Returns operation to Setup Screen.

4. TEST Soft Function Key F5

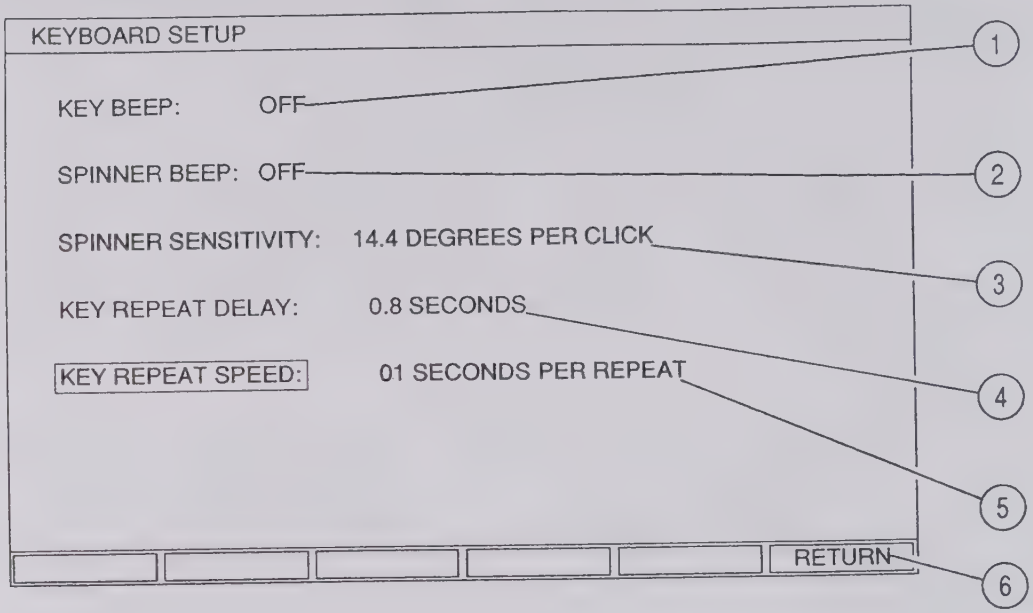
   Performs self test when pressed.

5. WORKING Indication

   Indicates test is currently being conducted.

G. KEYBOARD SETUP SCREEN

The Keyboard Setup Screen accesses operation parameters. Specific parameters are:



8717020

ITEM	DESCRIPTION

1. Key Beep

   Displays status of audible Key Beep. Displays ON or OFF.

2. Spinner Beep

   Displays status of audible Spinner Beep. Displays ON or OFF.

3. Spinner Sensitivity

   Displays turn amount for Spinner to change value. Range is 3.6 to 356.4 Degrees in 3.6 Degree steps. Entering 0 Degrees sets spinner to default of 14.4 Degrees.

4. Key Repeat Delay

   Displays Desired delay after key is pressed before Key function begins to repeat. Range is 0.1 to 25.5 sec. Entering 0 sets function to default of 0.8 sec.

5. Key Repeat Speed

   Displays Key repeat Speed. Range is 0.1 to 25.5 sec. Entering 0 sets 0.1 sec default.

6. RETURN Soft Function Key F6

   Returns operation to Setup Screen.

SECTION 4 - OPERATION

4-1 GENERAL NOTES ON OPERATION OF THE COM-120A

The following comments apply to all Operation Screens within the COM-120A. If operation in a particular field is different from what follows, it is discussed in detail within the procedure. Otherwise it is assumed that the operator has read these notes.

4-1-1 CURSOR MOVEMENT

A cursor, in the shape of a box, is used to identify what is currently editable. There are two methods to move the Cursor around the active screen. First the DATA SCROLL Keys are used as long as the current Cursor location is not currently being edited. The second method is to use the TAB Function as follows:

STEP	PROCEDURE

1. Press TAB Key.
2. Enter Value that appears in desired screen location using DATA ENTRY Key.
3. Press ENTER Key to complete operation.

4-1-2 EDITING FIELDS USING DATA SCROLL KEYS AND SPINNER

All fields can be edited using DATA SCROLL Keys and/or DATA SCROLL Spinner. Editing Numeric Data Fields is a special case and is covered in para 4-1-3. Edit the remainder of the fields using DATA SCROLL Keys and/or DATA SCROLL Spinner as follows:

STEP	PROCEDURE

1. Position cursor on field selected for edit using DATA SCROLL Keys or TAB Function.
2. Press ENTER Key to highlight field.
3. Press DATA SCROLL Key (↑) to move up through search field and DATA SCROLL Key (↓) to move down through search field. Alternate method is to use DATA SCROLL Spinner. Turning DATA SCROLL Spinner clockwise performs same operation as pressing DATA SCROLL Key (↑).
4. Press ENTER Key to complete operation.

4-1-3 EDITING NUMERIC DATA FIELDS

The primary method of editing data in numeric data fields such as frequencies and levels is to use DATA ENTRY Keys. The step-by-step procedure for this method is as follows:

STEP	PROCEDURE

1. Position cursor on field selected for data entry using DATA SCROLL Keys or TAB Function.
2. Enter numeric value using DATA ENTRY Keys.
3. Press ENTER Key to complete operation.

A second method to change current numeric values in small amounts is to use the DATA SCROLL Keys and/or DATA SCROLL Spinner. This method changes one digit of the value directly, but more significant digits are affected indirectly as the edited digit passes zero in either direction. The step-by-step procedure for this method is as follows:

STEP	PROCEDURE

1. Position cursor on field selected for data entry using DATA SCROLL Keys or TAB Key.

2. Press ENTER Key to highlight field.

3. Digit in field to be edited is not highlighted. Pressing DATA SCROLL Key (→) moves highlight to less significant digit. Pressing DATA SCROLL Key (←) moves highlight to more significant digit.

4. Once digit to be edited is selected, press DATA SCROLL Key (↑) to increase digit value and DATA SCROLL Key (↓) to decrease digit value. Alternate method is to use DATA SCROLL Spinner. Turning DATA SCROLL Spinner clockwise increases value and counterclockwise decreases value.

5. Press ENTER Key to complete operation.

4-1-4 MAKING SELECTIONS FROM MENUS

Whenever the number of selections for the position being edited exceeds the number of available Soft Function Keys, a MENU Soft Function Key is used. Pressing the MENU Soft Function Key opens a window of selections for the current cursor location. The window cursor is located at the currently active selection. To choose a different selection, move the cursor using the DATA SCROLL Keys or DATA SCROLL Spinner to the selection. Press the ENTER Key to complete the operation.

4-1-5 ESCAPING FROM EDIT WITHOUT CHANGE

An edit procedure can be exited at any time, without change, by pressing the ESC Key.

4-2 RF GENERATE OPERATION

Pressing the GEN MODE Key accesses the RF Generate Operation Screen. The purpose of the RF Generate Mode is for the COM-120A to act as a transmitter and test a receiver. What this section does is provide information in configuring the COM-120A to perform tests on the receiver.

Configuring the RF Generate Operation Screen is covered in a very generic sense in para 4-2-1. This section is provided to explain how each of the active fields are edited and what selections are available. It is not designed to perform a specific test, but instead is provided as a reference for operating the RF Generate Operation Screen. To fully understand this section, the operator must read and understand para 3-3-1 and para 4-1.

Starting with para 4-2-2, specific Operations and Tests are provided in a step-by-step procedure. Specific editing instructions for configuring the RF Generate Operation Procedure are not provided. It is assumed that the operator has read and understands para 4-2-1. A list of Operations available with the RF Generate Operation Screen follows:

Section	Title	Page
4-2-1	RF Generate General Operation	4-4
4-2-2	Generating FM Modulated RF Signal	4-34
4-2-3	Generating AM Modulated RF Signal	4-35
4-2-4	Generating PM Modulated RF Signal	4-36
4-2-5	Generating DCS Coded RF Signal	4-37
4-2-6	Generating DTMF Coded RF Signal	4-37
4-2-7	Generating RF Signal Using External Modulation	4-38
4-2-8	Generating Microphone Modulated RF Signal	4-38
4-2-9	Measuring Receiver Center Frequency	4-39
4-2-10	Measuring Receiver Sensitivity	4-40
4-2-11	Measuring Receiver Selectivity	4-40
4-2-12	Measuring Receiver Audio Output Level	4-40
4-2-13	Measuring Modulation Acceptance Bandwidth	4-41
4-2-14	Measuring Receiver IF Bandwidth	4-42

4-2-1 RF GENERATOR GENERAL OPERATION

A. RF GENERATE GENERAL OPERATION SCREEN

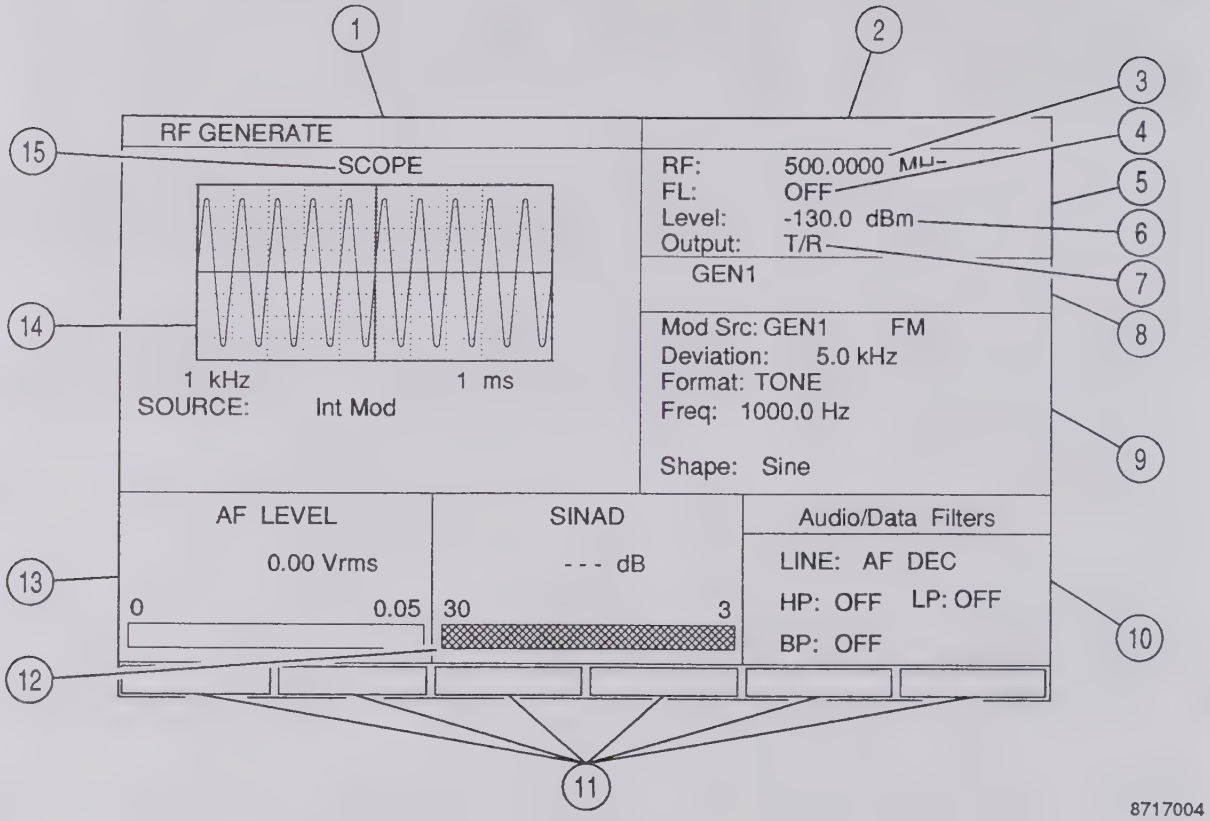


Figure 4-1 RF Generator Operation Screen

STEP	PROCEDURE

1. Enter desired frequency in RF Field (3). Frequency range is .2500 to 1000 MHz. Activate additional functions as required as follows:

   - To operate with Δ Function active:

     - Press Δ On/Off Soft Function Key F2 until Δ prompt appears beside RF Field (3).

     - Δ= increment is accessed by pressing Δ= Soft Function Key F1, activating window to set RF Field (3) change increment. Range is 0 to 500 MHz. Press RETURN Soft Function Key F6 to close Change Window.

     - To deactivate Δ Function, press Δ On/Off Soft Function Key F2 until Δ prompt no longer appears beside RF Field (3).

- To Operate with Set Reference Function, press SET REF Soft Function Key F3 until ***R*** appears beside RF Field (3). When active, RF Field (3) is set to 0 MHz and changes made to RF Field (3) display offset from Reference Frequency. To deactivate Set Reference Function, press SET REF Soft Function Key until ***R*** is not visible.

- To Operate with Sweep Operation, press SWEEP Soft Function Key F4 to open Sweep Configuration Window. Once Sweep Configuration Window is opened:

  - Move Cursor to Start Field. Enter Start Frequency for Sweep Operation.

  - Move Cursor to Stop Field. Enter Stop Frequency for Sweep Operation.

  - Move Cursor to Increment Field. Enter Increment for Sweep Operation.

  - Move Cursor to Pause Time Field. Enter time to pause at each frequency.

  - If single sweep is desired, press SINGLE Soft Function Key F3. If continuous sweep is desired, press START Soft Function Key F1. To stop Sweep Function, press STOP Soft Function Key F2. To resume Sweep Operation once stopped, press RESUME Soft Function Key F5.

  - Press RETURN Soft Function Key F6 to exit Sweep Function.

NOTE: Set Reference Function and Sweep Function cannot be active simultaneously.

- To Operate with RF Generate, RF Receive and Spectrum Analyzer RF Frequencies locked, press LOCK/UNLOCK Soft Function Key F5 until ***L*** is displayed beside RF Field and UNLOCK is displayed for F5 definition. Press UNLOCK Soft Function Key F5 to set LOCK Function to OFF.

2. If Frequency List Operation is desired instead of entering frequency in RF Field (3), select Frequency List (4) Setting as follows:

   - Select desired Frequency List (4) Type as follows:

     - Press T-Fwd Soft Function Key F2 to select Trunking Forward Channel List.

     - Press T-Rvs Soft Function Key F3 to select Trunking Reverse Channel List.

     - Press C-Fwd Soft Function Key F4 to select Cellular Forward Channel List.

     - Press C-Rvs Soft Function Key F5 to select Cellular Reverse Channel List.

     - Press FL Soft Function Key F6 to select User Defined Frequency List.

   - Press ON/OFF Soft Function Key F1 to active Frequency List (4) Setting.

   - If Cellular Channel List or User Defined Frequency List is selected, enter channel/frequency number. Range of cellular channels is 1 to 1023. Range of Frequency List is 0 to 99.

NOTE: Refer to para 3-3-8(A) for information on editing User Defined Frequency List.

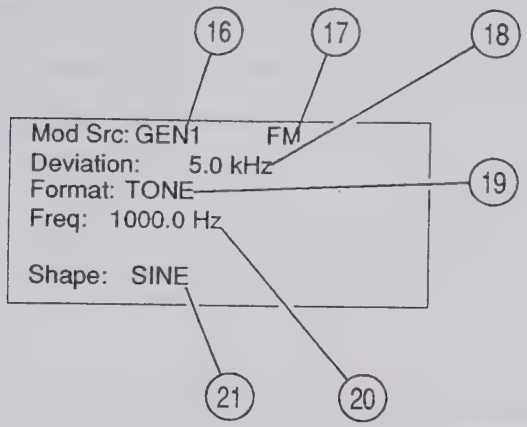
- If Trunking Channel List is selected, select channel number. Select Frequency Band by moving cursor to Frequency Band Field and pressing ENTER. Select desired Frequency Band using DATA SCROLL Keys or DATA SCROLL Spinner. Press ENTER Key.

3. Set Output Level (6) as follows:

   - Select Output Level Units as follows:
     - Press dBm Soft Function Key F1 to select dBm as Output Level Units.
     - Press uV Soft Function Key F2 to select µV as Output Level Units.
     - Press mV Soft Function Key F3 to select mV as Output Level Units.
     - Press V Soft Function Key F4 to select V as Output Level Units.
   - Once Output Level Units are selected, select Output Level.
   - To operate with SINAD Search Function:
     - Press SINAD= Soft Function Key F5 to access field to set SINAD Search Function value. Range of SINAD = is 6 to 30 dB.
     - Press S=On/Off Soft Function Key F6 until ***S=*** is displayed beside Output Level Field to activate SINAD Search Function.
     - Press S=On/Off Soft Function Key F6 until ***S=*** disappears to deactivate SINAD Search Function.

4. Select Output (7) as follows:

   - Press T/R Soft Function Key F1 to select T/R Connector as output connector.
   - Press AUX Soft Function Key F2 to select AUX RF Connector as output connector.
   - Press T/R Gate Soft Function Key F3 to select T/R Connector as output connector.
   - Press AUX Gate Soft Function Key F4 to select AUX RF Connector as gated output connector.



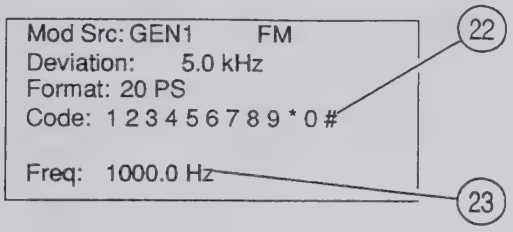
5. Modulation Source Window (8) displays all active Function Generators. To activate or deactivate Function Generators, each Function Generator must be edited separately. Set Modulation Source Block (9) as follows:

   - If Audio Generator 1 (GEN1) Operation is desired, perform Step 6.
   - If Audio Generator 2 (GEN2) Operation is desired, perform Step 7.
   - If DATA Generator (DATA) Operation is desired, perform Step 8.
   - If DTMF Generator (DTMF) Operation is desired, perform Step 9.
   - If External Modulation (EXT) Operation is desired, perform Step 10.
   - If Microphone Modulation (MIC) Operation is desired, perform Step 11.

6. If Audio Generator 1 (GEN1) Operation is desired, set Modulation Source Block (9) as follows:

   - Press GEN1 Soft Function Key F1 to select GEN1 for Modulation Source (16).
   - Select Modulation Type (17) as follows:
     - Press OFF Soft Function Key F1 to deactivate GEN1.
     - Press AM Soft Function Key F2 if AM Modulation is desired.
     - Press FM Soft Function Key F3 if FM Modulation is desired.
     - Press PM Soft Function Key F4 if PM Modulation is desired.
   - Enter Deviation/Modulation Level (18). Range is 0.0 to 100 kHz for FM Modulation, 0% to 100% for AM Modulation and 0 to 10 Radians for PM Modulation.

- Select Format (19). Formats available include TONE and USER.
- With cursor on Format (19), select transmission type:
  - Press CONT Soft Function Key F2 to select continuous transmission of signal.
  - Press BURST Soft Function Key F3 if single transmission of selected signal.
  - If TONE is selected as Format (19), press TIME Soft Function Key F4 to access Burst TIme WIndow. Enter Burst Time. Press RETURN Soft Function Key F6 to exit Window.
  - IF USER is selected as Format (19), press CONFIG Soft Function Key F4 to access Configuration Window for configuring User Selectable Frequency and Duration for codes 0 through 9 and A through T. Enter desired frequencies and durations for codes. Range of frequencies are 0 to 9999.9 Hz. Range of durations are 0 to 99.999 seconds. Use PG UP Soft Function Key F1 to scroll up through Configuration Window. Use PG DN to scroll down through Configuration Window. Use FILL Soft Function Key F3 to fill remainder of current column with value of current cursor position. Press RETURN Soft Function Key F6 to exit Window.
- If TONE is selected as Format (19):
  - Enter Audio Tone Frequency (20). Range is 0 to 20000 Hz with Shape (21) set to SINE. Range is 0 to 10000 Hz otherwise.
  - Select Shape (21) of Wave as follows:
    - Press SINE Soft Function Key F1 to select SINE Wave Shape.
    - Press RAMP Soft Function Key F2 to select RAMP Wave Shape.
    - Press TRIANGLE Soft Function Key F3 to select TRIANGLE Wave Shape.
    - Press SQUARE Soft Function Key F4 to select SQUARE Wave Shape.



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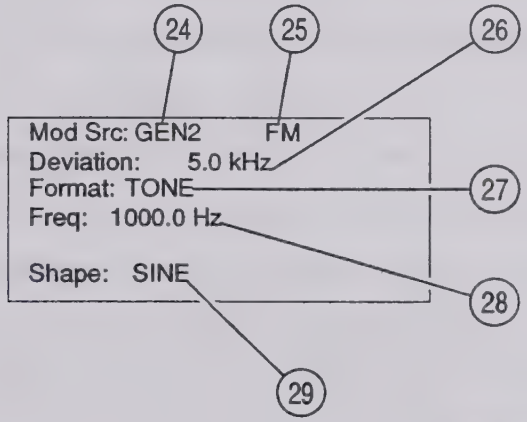
- If TONE is not selected Format (19):
  - Enter Code (22). Pressing CLEAR Soft Function Key F1 clears current code entry.



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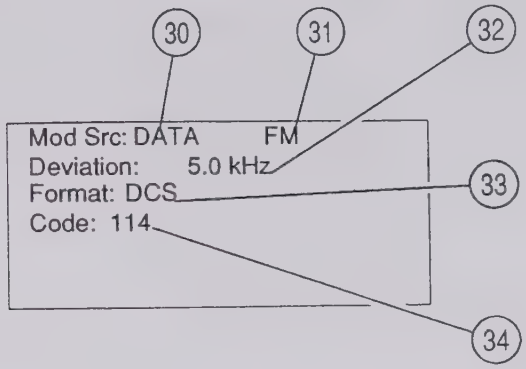
7. If Audio Generator 2 (GEN2) Operation is desired, set Modulation Source Block (9) as follows:
   - Press GEN2 Soft Function Key F2 to select GEN2 for Modulation Source (24).
   - Select Modulation Type (25) as follows:
     - Press OFF Soft Function Key F1 to deactivate GEN2.
     - Press AM Soft Function Key F2 if AM Modulation is desired.
     - Press FM Soft Function Key F3 if FM Modulation is desired.
     - Press PM Soft Function Key F4 if PM Modulation is desired.
   - Enter Deviation/Modulation Level (26). Range is 0.0 to 100 kHz for FM Modulation, 0% to 100% for AM Modulation and 0 to 10 Radians for PM Modulation.



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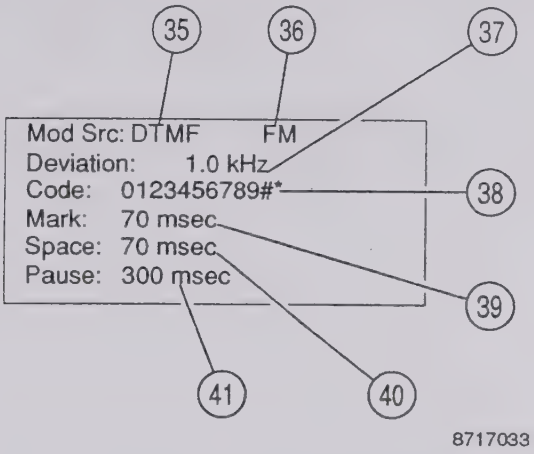
8. If DATA Generator (DATA) Operation is desired, set Modulation Source Block (9) as follows:

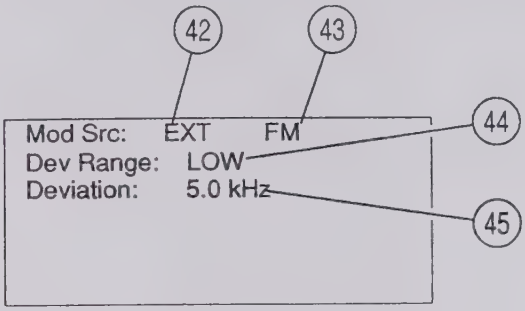
   - Press DATA Soft Function Key F3 to select DATA for Modulation Source (30).
   - Select Modulation Type (31) as follows:
     - Press OFF Soft Function Key F1 to deactivate DATA.
     - Press AM Soft Function Key F2 if AM Modulation is desired.
     - Press FM Soft Function Key F3 if FM Modulation is desired.
     - Press PM Soft Function Key F4 if PM Modulation is desired.
   - Enter Deviation/Modulation Level (32). Range is 0.0 to 100 kHz for FM Modulation, 0% to 100% for AM Modulation and 0 to 10 Radians for PM Modulation.
   - Select Format (33) as follows:
     - Press DCS Soft Function Key F1 to select DCS Format.
     - Press DCS/ Soft Function Key F2 to select DCS Inverted Format.
   - Enter desired Code (34). Range is 000 (Octal) to 777 (Octal).



9. If DTMF Generator (DTMF) Operation is desired, set Modulation Source Block (9) as follows:

   - Press DTMF Soft Function Key F4 to select DTMF for Modulation Source (35).
   - Select Modulation Type (36) as follows:
     - Press OFF Soft Function Key F1 to deactivate DTMF.
     - Press AM Soft Function Key F2 if AM Modulation is desired.
     - Press FM Soft Function Key F3 if FM Modulation is desired.
     - Press PM Soft Function Key F4 if PM Modulation is desired.
   - Enter Deviation/Modulation Level (37). Range is 0.0 to 100 kHz for FM Modulation, 0% to 100% for AM Modulation and 0 to 10 Radians for PM Modulation.
   - Enter DTMF Code (38).
   - Select desired Operation as follows:
     - Press CLEAR Soft Function Key F1 to clear code field of current data.
     - Press CONT Soft Function Key F2 to activate DTMF Code (38) in repeating loop.
     - Press BURST Soft Function Key F3 to activate DTMF Code (38) for one tone sequence.
     - Press KEY Soft Function Key F4 to set DATA ENTRY Keys as DTMF keypad.
   - Enter selected Mark Time (39) for DTMF tones. Range is 25 to 999 ms.
   - Enter selected Space Time (41) for DTMF tones. Range is 25 to 999 ms.

- Enter selected Pause Time (40) for DTMF tones. Range is 25 to 999 ms.



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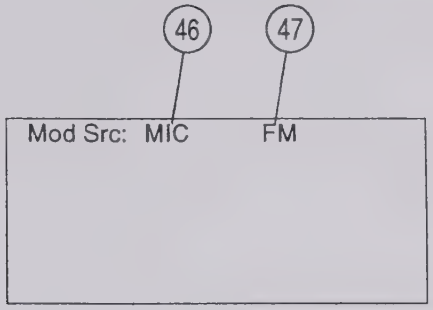
10. If External Modulation (EXT) Operation is desired, set Modulation Source Block (9) as follows:

    - Press EXT Soft Function Key F5 to select EXT for Modulation Source (42).
    - Select Modulation Type (43) as follows:
        - Press OFF Soft Function Key F1 to deactivate EXT.
        - Press AM Soft Function Key F2 if AM Modulation is desired.
        - Press FM Soft Function Key F3 if FM Modulation is desired.
        - Press PM Soft Function Key F4 if PM Modulation is desired.
    - If FM Modulation is selected, select Dev (Deviation) Range (44) as follows:
        - Press LOW Soft Function Key F1 for ***LOW*** Deviation Range (44) setting for deviation <20 kHz.
        - Press HIGH Soft Function Key F2 for ***HIGH*** Deviation Range (44) setting for deviation ≥20 to 100 kHz.

          NOTE: If other sources are Frequency Modulated and total deviation exceeds 20 kHz, Deviation Range (44) is automatically set to ***HIGH***.



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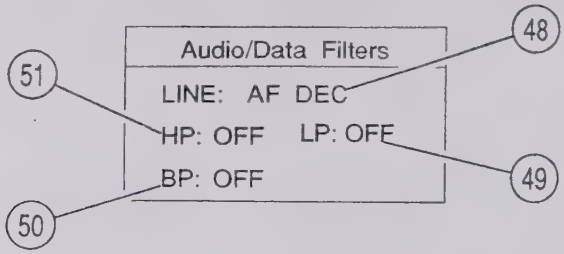
11. If Microphone Modulation (MIC) Operation is desired, set Modulation Source Block (9) as follows:

    - Press MIC Soft Function Key F6 to select MIC for Modulation Source (46).
    - Select Modulation Type (47) as follows:
        - Press OFF Soft Function Key F1 to deactivate MIC.
        - Press AM Soft Function Key F2 if AM Modulation is desired.
        - Press FM Soft Function Key F3 if FM Modulation is desired.
        - Press PM Soft Function Key F4 if PM Modulation is desired.



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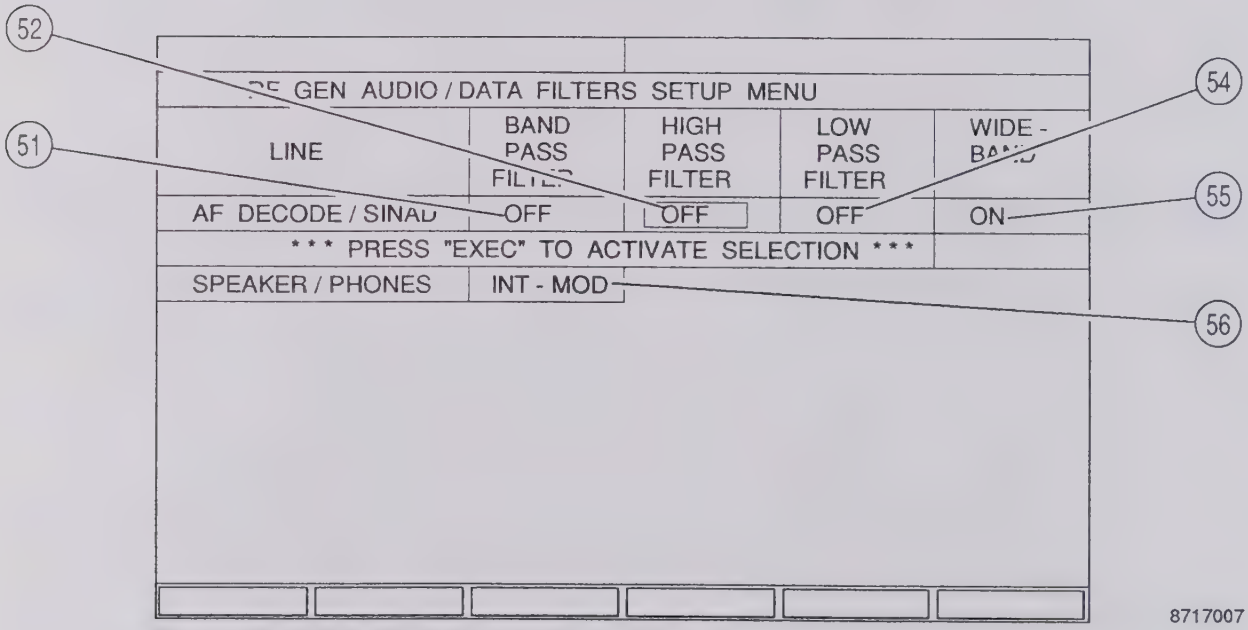

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12. If Audio/Data Filters are required for operation of Meters or Speaker, configure and activate required filters as follows:

NOTE: High-Pass Filter/Low-Pass Filter combination and Bandpass Filter will not operate simultaneously on same Filter Line.

- With cursor on Filter Line (48), press CONFIG Soft Function Key F6 to access RF Generator Filters Menu.
- Select AF DECODE/SINAD Bandpass Filter Field (52) setting as follows:
  - Press OFF Soft Function Key F1 to set Filter to OFF.
  - Press C-MSG Soft Function Key F2 to select C-Message Weighted Filter.
- Select AF DECODE/SINAD High-Pass Filter Field (53) setting as follows:
  - Press OFF Soft Function Key F1 to set Filter to OFF.

- Press 300 Hz Soft Function Key F2 to activate 300 Hz High-Pass Filter.
- Press 4 kHz Soft Function Key F3 to activate 4 kHz High-Pass Filter.

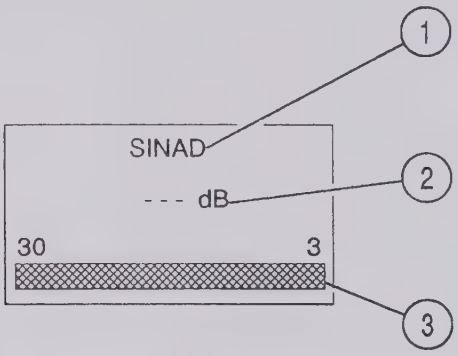
- Select AF DECODE/SINAD Low-Pass Filter Field (54) setting as follows:
  - Press OFF Soft Function Key F1 to set Filter to OFF.
  - Press 300 Hz Soft Function Key F2 to activate 300 Hz Low-Pass Filter.
  - Press 4 kHz Soft Function Key F3 to activate 4 kHz Low-Pass Filter.
  - Press 20 kHz Soft Function Key F4 to activate 20 kHz Low-Pass Filter.
- Press EXEC Soft Function Key F5 to Execute all edits made to the screen.
- Select Speaker/Headphones Filter Field (58) setting as follows:
  - Press OFF Soft Function Key F1 to set Filter to OFF.
  - Press C-MSG Soft Function Key F2 to select C-Message Weighted Filter.
  - Press W.B. Soft Function Key F3 to select no filtering.
  - Press INT-MOD Soft Function Key F4 to route from Internal Modulation Sources to Speaker.
- Move Cursor off Speaker/Headphones Filter Field (58) and press RETURN Soft Function Key F6 to return to RF Generate Operation Screen.
- To display different Filter Line (48) settings:
  - Press AF DEC Soft Function Key F1 to display AF DECODE/SINAD Filter Settings.
  - Press SPKR Soft Function Key F2 to display Speaker/Headphones Filter Settings.

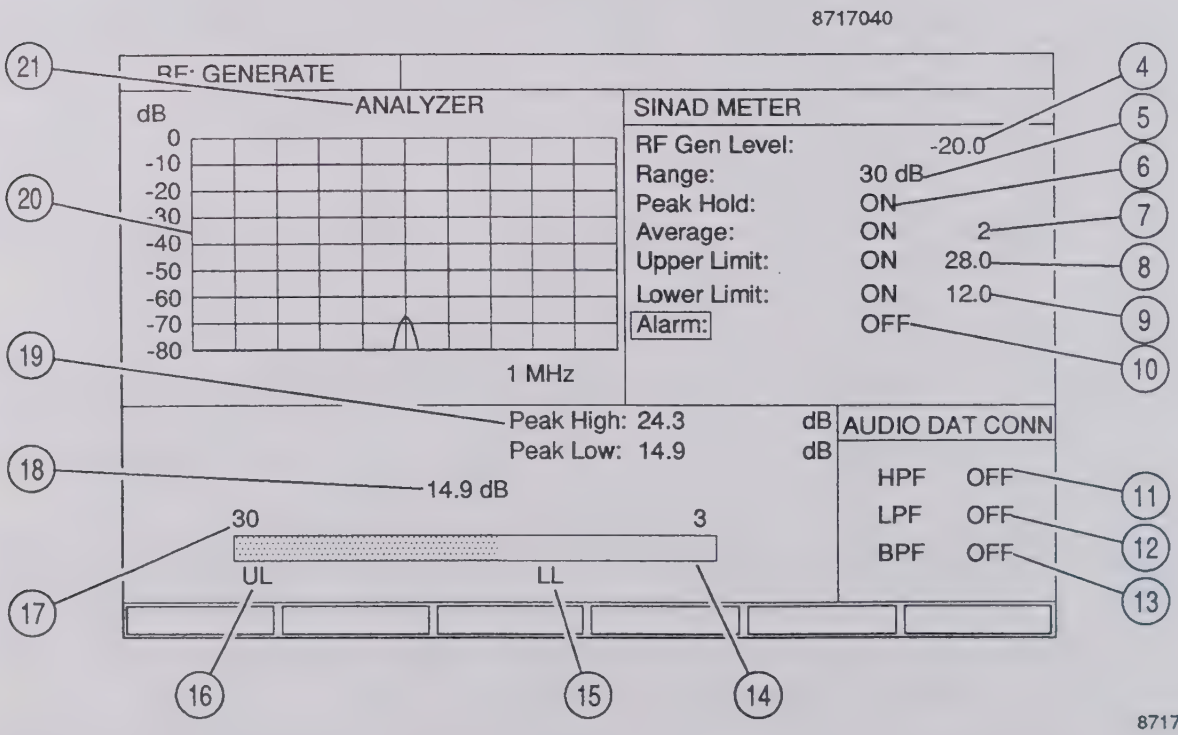
13. Refer to para 4-2-1(B) for information on configuring SINAD Meter. Refer to para 4-2-1(C) for information on configuring Distortion Meter. Select desired Meter Operation as follows:
    - Press SINAD Soft Function Key F2 to select SINAD Meter as active meter. Not displayed if meter is currently active.
    - Press DIST Soft Function Key F3 to select Distortion Meter as active meter. Not displayed if meter is currently active.
14. Refer to para 4-2-1(D) for information on configuring AF Level Meter (13).
15. Refer to para 4-2-1(E) for information on configuring RF Generator Oscilloscope and para 4-2-1(F) for information on configuring RF Generator Spectrum Analyzer. If desired instrument is not shown, press ANALY/SCOPE Soft Function Key F2.

B. SINAD METER

The SINAD Meter for the RF Generate Operation Screen measures SINAD for an audio signal passed through the AUDIO/DATA IN Connector. Filtering for the signal passed to the SINAD Meter is provided by the Audio/Data Filters. Refer to para 4-2-1(A) for information on configuring filters available.

Configure and operate the SINAD Meter as follows:





STEP	PROCEDURE

1. With cursor on SINAD/Distortion Meter Label (1), press ZOOM Soft Key F1. Full Screen SINAD Meter is displayed.

2. Enter RF Gen Level as required. Editing field affects Level on RF Generate Operation Screen. To operate with SINAD Search Function:

   - Press SINAD= Soft Function Key F5 to access field to set SINAD Search Function value. Range of SINAD= is 6.0 to 30.0 dB.
   - Press S=On/Off Soft Function Key F6 until ***S=*** is displayed beside RF Gen Level Field to activate SINAD Search Function.
   - Press S=On/Off Soft Function Key F6 until ***S=*** disappears to deactivate SINAD Search Function.

3. Select Range (5) as follows:

   - Press 15 dB Soft Function Key F1 to select 15 dB Range (5).
   - Press 30 dB Soft Function Key F2 to select 30 dB Range (5).
   - Press AUTO Soft Function Key F3 to select Autorange for Range (5).

4. If Peak Hold Function is desired, configure as follows:

   - With cursor on Peak Hold (6), press OFF/ON Soft Function Key F1 until Peak Hold (6) displays ***ON***.
   - Peak Hold Function can be reset as desired by pressing RST PK Soft Function Key F5 where displayed.
   - Set Peak Hold Function to OFF by pressing OFF/ON Soft Function Key F1 until Peak Hold (6) displays ***OFF***.

5. If Average Function is desired, configure as follows:

   - With cursor on Average (7), press OFF/ON Soft Function Key F1 until Average (7) displays ***ON*** and Sample Number appears.
   - Enter Sample Number. Range is 2 to 10.
   - Set Average Function to OFF by pressing OFF/ON Soft Function Key F1 until Average (7) displays ***OFF***.

6. If Upper Limit Function is desired, configure as follows:

   - With cursor on Upper Limit (8), press OFF/ON Soft Function Key F1 until Upper Limit (8) displays ***ON*** and Limit Value appears.
   - Enter Limit Value. Range is 0 to 30.
   - Set Upper Limit Function to OFF by pressing OFF/ON Soft Function Key F1 until Upper Limit (8) displays ***OFF***.

7. If Lower Limit Function is desired, configure as follows:

   - With cursor on Lower Limit (9), press OFF/ON Soft Function Key F1 until Lower Limit (9) displays ***ON*** and Limit Value appears.
   - Enter Limit Value. Range is 0 to 30.
   - Set Lower Limit Function to OFF by pressing OFF/ON Soft Function Key F1 until Lower Limit (9) displays ***OFF***.

8. If Alarm Function is desired, configure as follows:

   - With cursor on Alarm (10), press OFF/ON Soft Function Key F1 until Alarm (10) displays ***ON***.
   - Set Alarm Function to OFF by pressing OFF/ON Soft Function Key F1 until Alarm (10) displays ***OFF***.

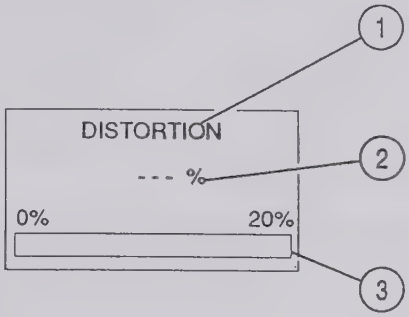
9. Refer to para 4-2-1(E) for information on configuring RF Generator Oscilloscope and para 4-2-1(F) for information on configuring RF Generator Spectrum Analyzer.

10. If displayed, press RETURN Soft Function Key F6 to return to RF Generate Operation Screen. Alternately, press GEN MODE Key to return to RF Generate Operation Screen.

C. DISTORTION METER

The Distortion Meter for the RF Generate Operation Screen measures Distortion for an audio signal passed through the AUDIO/DATA IN Connector. Filtering for the signal passed to the Distortion Meter is provided by the Audio/Data Filters. Refer to 3-3-1(C) for information on filters available.

Configure and operate the Distortion Meter as follows:



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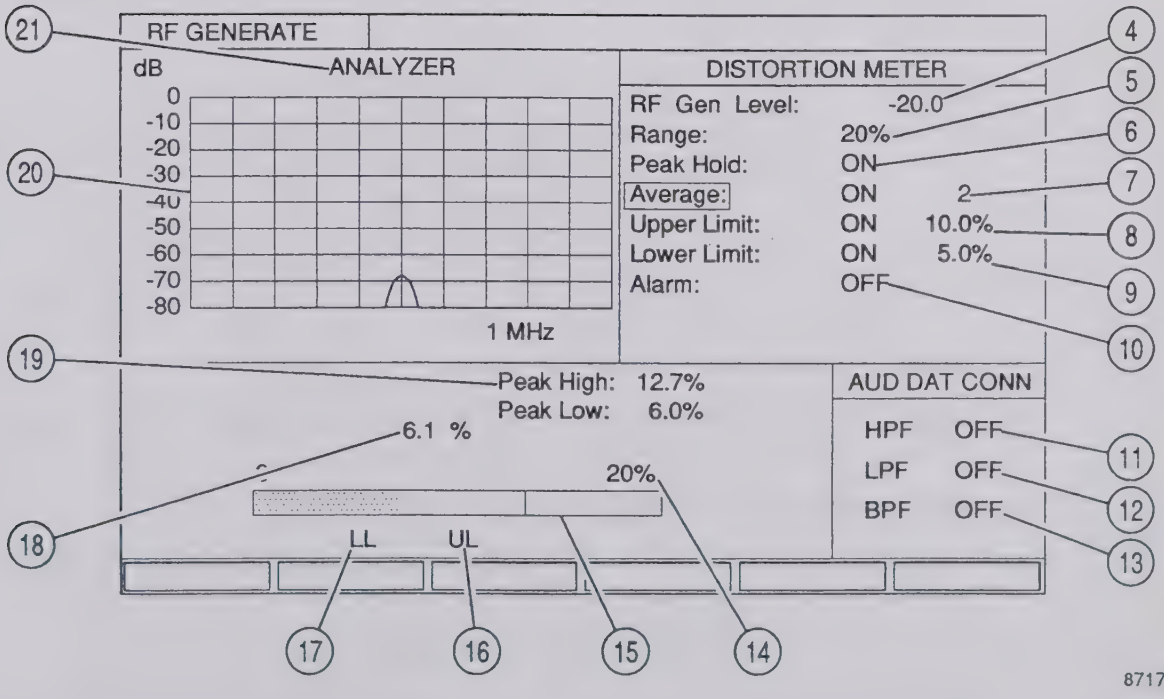

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STEP	PROCEDURE

1. With cursor on SINAD/Distortion Meter Label (1), press ZOOM Soft Key F1. Full Screen Distortion Meter is displayed.

2. Enter RF Gen Level as required. Editing field affects Level on RF Generate Operation Screen.

3. If Peak Hold Function is desired, configure as follows:

   - With cursor on Peak Hold (6), press OFF/ON Soft Function Key F1 until Peak Hold (6) displays ***ON***.
   - Peak Hold Function can be reset as desired by pressing RST PK Soft Function Key F5 where displayed.
   - Set Peak Hold Function to OFF by pressing OFF/ON Soft Function Key F1 until Peak Hold (6) displays ***OFF***.

4. If Average Function is desired, configure as follows:

   - With cursor on Average (7), press OFF/ON Soft Function Key F1 until Average (7) displays ***ON*** and Sample Number appears.
   - Enter Sample Number. Range is 2 to 10.
   - Set Average Function to OFF by pressing OFF/ON Soft Function Key F1 until Average (7) displays ***OFF***.

5. If Upper Limit Function is desired, configure as follows:

   - With cursor on Upper Limit (8), press OFF/ON Soft Function Key F1 until Upper Limit (8) displays ***ON*** and Limit Value appears.
   - Enter Limit Value. Range is 0% to 20%.
   - Set Upper Limit Function to OFF by pressing OFF/ON Soft Function Key F1 until Upper Limit (8) displays ***OFF***.

6. If Lower Limit Function is desired, configure as follows:

   - With cursor on Lower Limit (9), press OFF/ON Soft Function Key F1 until Lower Limit (9) displays ***ON*** and Limit Value appears.
   - Enter Limit Value. Range is 0% to 20%.
   - Set Lower Limit Function to OFF by pressing OFF/ON Soft Function Key F1 until Lower Limit (9) displays ***OFF***.

7. If Alarm Function is desired, configure as follows:

   - With cursor on Alarm (10), press OFF/ON Soft Function Key F1 until Alarm (10) displays ***ON***.

- Set Alarm Function to OFF by pressing OFF/ON Soft Function Key F1 until Alarm (10) displays ***OFF***.

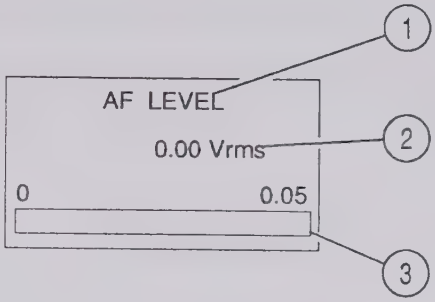
8. Refer to para 4-2-1(E) for information on configuring RF Generator Oscilloscope and para 4-2-1(F) for information on configuring RF Generator Spectrum Analyzer.

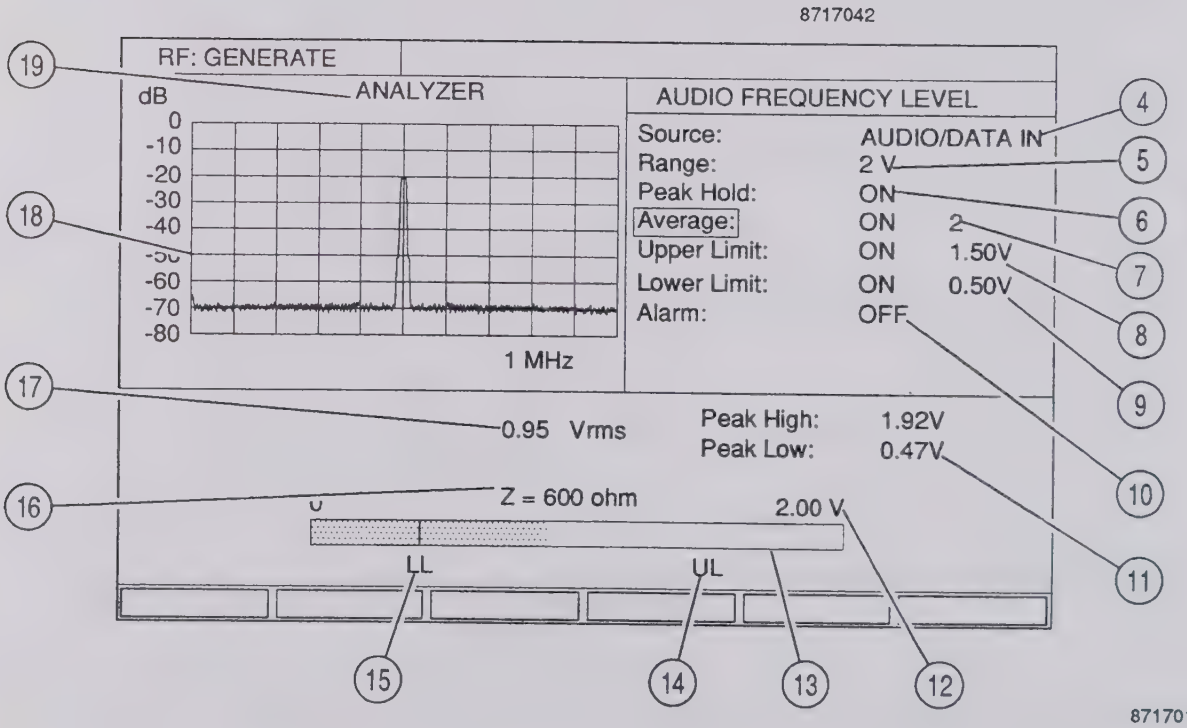
9. If displayed, press RETURN Soft Function Key F6 to return to RF Generate Operation Screen. Alternately, press GEN MODE Key to return to RF Generate Operation Screen.

D. AUDIO FREQUENCY LEVEL (AF LVL) METER

The Audio Frequency Level Meter for the RF Generate measures the level of an audio signal passed through the AUDIO/DATA IN Connector. Measurements made are in Vrms, dBm (referenced to Impedence [16]) or dB as selected by user.

Configure and operate the AF Level Meter as follows:





STEP PROCEDURE

1. With cursor on AF LVL Meter Label (1), press ZOOM Soft Key F1. Full Screen Audio Frequency Level Meter is displayed.

2. Select desired Range (5). Selections include AUTO (Autorange) and the following:

50 mVrms	100 mVrms	200 mVrms
500 mVrms	1 Vrms	2 Vrms
5 Vrms	10 Vrms	20 Vrms
50 Vrms		

   NOTE: Selecting Digital Readout (17) units of dBm or dB sets Range (5) to Autorange.

3. If Peak Hold Function is desired, configure as follows:

   - With cursor on Peak Hold (6), press OFF/ON Soft Function Key F1 until Peak Hold (6) displays ***ON***.
   - Peak Hold Function can be reset as desired by pressing RST PK Soft Function Key F5 where displayed.
   - Set Peak Hold Function to OFF by pressing OFF/ON Soft Function Key F1 until Peak Hold (6) displays ***OFF***.

4. If Average Function is desired, configure as follows:

   - With cursor on Average (7), press OFF/ON Soft Function Key F1 until Average (7) displays ***ON*** and Sample Number appears.
   - Enter Sample Number. Range is 2 to 10.
   - Set Average Function to OFF by pressing OFF/ON Soft Function Key F1 until Average (7) displays ***OFF***.

5. If Upper Limit Function is desired, configure as follows:

   - With cursor on Upper Limit (8), press OFF/ON Soft Function Key F1 until Upper Limit (8) displays ***ON*** and Limit Value appears.
   - Enter Limit Value. Range is 0 to 50 Vrms.
   - Set Upper Limit Function to OFF by pressing OFF/ON Soft Function Key F1 until Upper Limit (8) displays ***OFF***.

6. If Lower Limit Function is desired, configure as follows:

   - With cursor on Lower Limit (9), press OFF/ON Soft Function Key F1 until Lower Limit (9) displays ***ON*** and Limit Value appears.
   - Enter Limit Value. Range is 0 to 50 Vrms.
   - Set Lower Limit Function to OFF by pressing OFF/ON Soft Function Key F1 until Lower Limit (9) displays ***OFF***.

7. If Alarm Function is desired, configure as follows:

   - With cursor on Alarm (10), press OFF/ON Soft Function Key F1 until Alarm (10) displays ***ON***.
   - Set Alarm Function to OFF by pressing OFF/ON Soft Function Key F1 until Alarm (10) displays ***OFF***.

8. Select desired Units for Digital Readout (17) as follows:

   - Press Vrms Soft Function Key F1 to select units of Vrms.
   - Press dBm Soft Function Key F2 to select units of dBm.
   - Press dB Soft Function Key F3 to select units of dB. Press dB Soft Function Key F3 as needed to set current reading as Reference.

9. If Digital Readout (17) Units are dBm, select Impedance (16). Range is 0 to 999 Ω.

10. Refer to para 4-2-1(E) for information on configuring RF Generator Oscilloscope and para 4-2-1(F) for information on configuring RF Generator Spectrum Analyzer. If desired instrument is not shown, press ANALY/SCOPE Soft Function Key F2.

11. If displayed, press RETURN Soft Function Key F6 to return to RF Generate Operation Screen. Alternately, press GEN MODE Key to return to RF Generate Operation Screen.

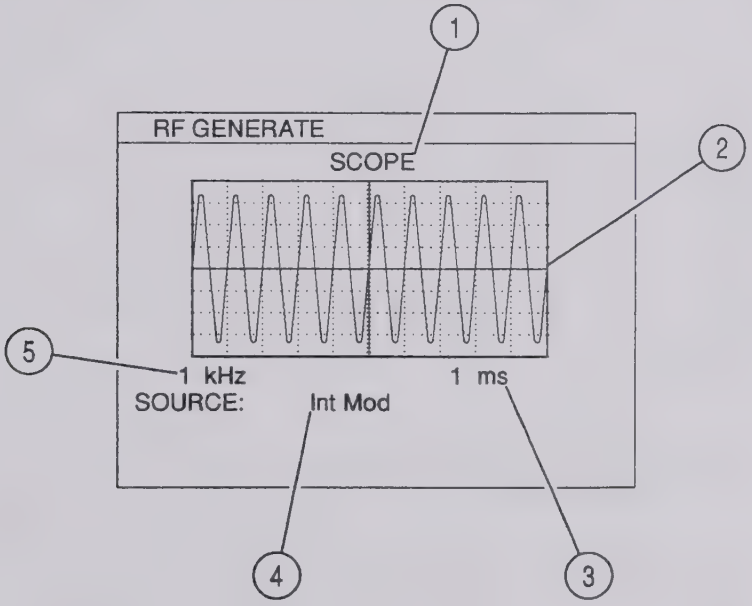
E. OSCILLOSCOPE OPERATION SCREEN

The RF Generator Oscilloscope is usable as an abbreviated Oscilloscope and as a Full Screen Oscilloscope. Configuring one is reflected in the other.

The abbreviated Oscilloscope, as shown below, is visible from the RF Generate Operation Screen and the following meters:

SINAD Meter Operation Screen (para 4-2-1[B])
Distortion Meter Operation Screen (para 4-2-1[C])
Audio Frequency Level Meter Operation Screen (4-2-1[D])

Parameters set on any of the Operation Screens are reflected in all. Configuring the abbreviated Oscilloscope is as follows:



STEP	PROCEDURE

1. Select Sweep (3). Selections include:

100 µs/Div	200 µs/Div	500 µs/Div
1 ms/Div	2 ms/Div	5 ms/Div
10 ms/Div	20 ms/Div	50 ms/Div
100 ms/Div		

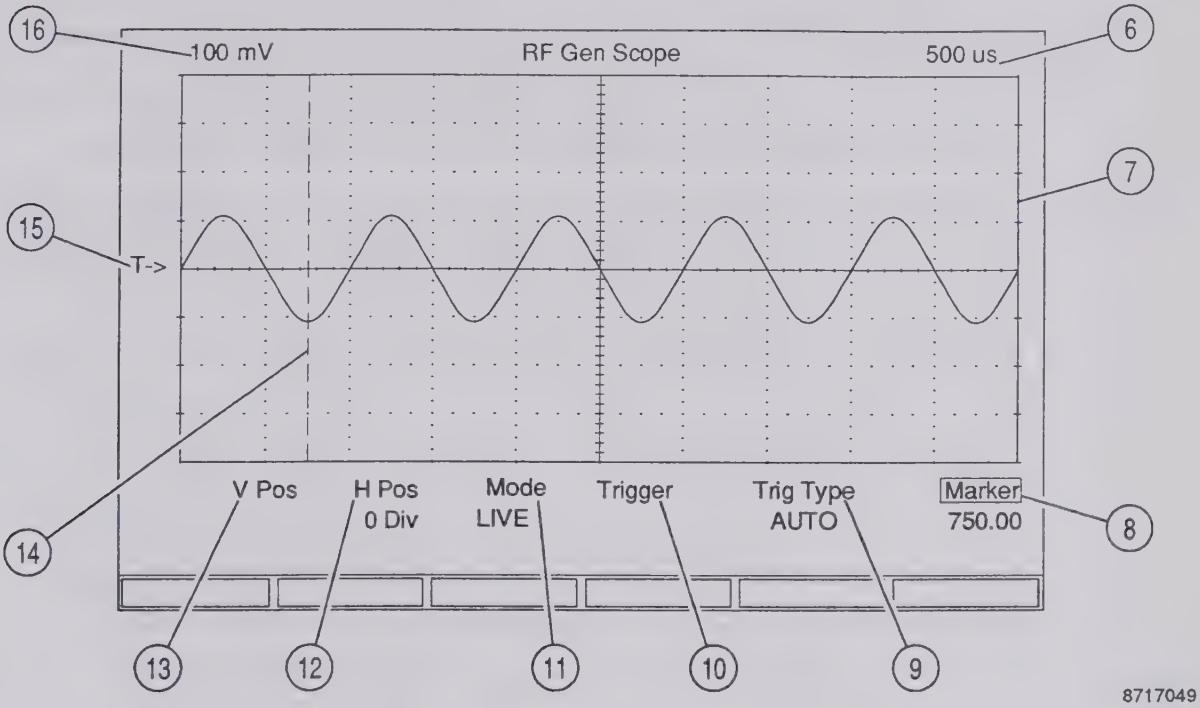
2. Select SCOPE SOURCE (4). Selections include:

Source	Signal Input	Signal Type
Scope/DVM-GND	SCOPE/DVM Connector	External Ground-Coupled Signal
Scope/DVM-AC	SCOPE/DVM Connector	External AC-Coupled Signal
Scope/DVM-DC	SCOPE/DVM Connector	External DC-Coupled Signal
Ext Mod	EXT MOD IN Connector	External Modulation
Notch Residual	Internal Filtered Signal	Notch Filtered Signal passed to SINAD and Distortion Meters. Reading is relative with no units applied.
Audio/Data In	AUDIO/DATA IN Connector	External Audio or Data Signal
Int Mod	Internal Modulation	Composite Modulation Signal generated by Internal Audio/Data Generators

3. Select Oscilloscope Scale (5). Selections include:

SCOPE SOURCE (4)	Available Scales
Scope/DVM-GND	10, 20, 50, 100, 200, 500 mV/Div 1, 2, 5, 10, 20, 50 V/Div
Scope/DVM-AC	10, 20, 50, 100, 200, 500 mV/Div 1, 2, 5, 10, 20, 50 V/Div
Scope/DVM-DC	10, 20, 50, 100, 200, 500 mV 1, 2, 5, 10, 20, 50 V
Ext Mod	100, 200, 500 mV/Div 1, 2, 5 V/Div
Notch Residual	0.02, 0.04, 0.10, 0.20, 0.40, 1.00
Audio/Data In	100, 200, 500 mV/Div 1, 2, 5 V/Div
Int Mod	1, 2, 5, 10, 20, 50 kHz/Div

Pressing ZOOM Soft Function Key F1 accesses full screen Oscilloscope, when cursor is on SCOPE/ANALYZER Prompt (1) of RF Generate Operation Screen and abbreviated Oscilloscope is displayed. SCOPE SOURCE (4) must be selected before Full Screen Oscilloscope is accessed. Configure the full screen Oscilloscope as follows:



STEP	PROCEDURE

1. Select Sweep (6). Selections include:

100 µs/Div	200 µs/Div	500 µs/Div
1 ms/Div	2 ms/Div	5 ms/Div
10 ms/Div	20 ms/Div	50 ms/Div
100 ms/Div		

2. Select Trigger Type (9) as follows:

   - Press NORM Soft Function Key F1 to select Normalized Trigger.
   - Press AUTO Soft Function Key F2 to select Auto Trigger.
   - Press 1 SHOT Soft Function Key F3 to select One Shot Trigger. Press 1 SHOT Soft Function Key F3 as needed to reset Trigger.

3. Set Trigger Level (15) as follows:

   - Move cursor to Trigger (10).
   - Use DATA SCROLL Spinner or DATA SCROLL Keys to set Trigger.

4. Select Operation Mode (11) as follows:
   - Press LIVE Soft Function Key F2 to select Live Operation Mode.
   - Press AVG Soft Function Key F3 to select Average Operation Mode.
   - Press COMPARE Soft Function Key F4 to select Compare Operation Mode.
   - Press RECALL Soft Function Key F5 to select Recall Operation Mode.
   - Press STORE Soft Function Key F6 to select Store Operation Mode.
5. Select H Pos (12) Offset as needed. Range is -10 to 10 Divisions.
6. Set Vertical Position of trace as needed by accessing V Pos (13) and editing with DATA SCROLL Keys or DATA SCROLL Spinner.
7. Select Oscilloscope Scale (16). Selections available are dependent on Scope Source (4). Selections include:

SCOPE SOURCE (4)	Available Scales
Scope/DVM-GND	10, 20, 50, 100, 200, 500 mV/Div 1, 2, 5, 10, 20, 50 V/Div
Scope/DVM-AC	10, 20, 50, 100, 200, 500 mV/Div 1, 2, 5, 10, 20, 50 V/Div
Scope/DVM-DC	10, 20, 50, 100, 200, 500 mV 1, 2, 5, 10, 20, 50 V
Ext Mod	100, 200, 500 mV/Div 1, 2, 5 V/Div
Notch Residual	0.02, 0.04, 0.10, 0.20, 0.40, 1
Audio/Data In	100, 200, 500 mV/Div 1, 2, 5 V/Div
Int Mod	1, 2, 5, 10, 20, 50 kHz/Div

8. Activate Marker (14), as required, as follows:
   - With Cursor on Marker Position (8), press On/Off Soft Function Key F1.
   - Enter Desired Marker Position using DATA ENTRY Keys or DATA SCROLL Keys and/or DATA SCROLL Spinner.

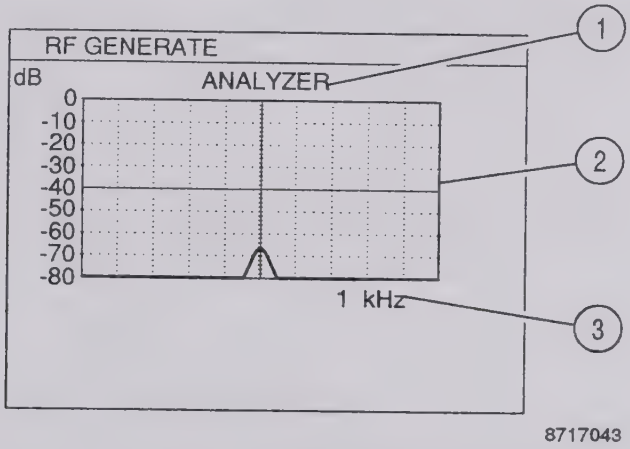
F. SPECTRUM ANALYZER OPERATION SCREEN

The RF Generator Spectrum Analyzer is usable as an abbreviated Spectrum Analyzer or as a Full Screen Spectrum Analyzer. Configuring one is reflected in the other.

The abbreviated Spectrum Analyzer, as shown below, is visible from the RF Generate Operation Screen and the following Meters:

SINAD Meter Operation Screen (4-2-1[B])
Distortion Meter Operation Screen (4-2-1[C])
Audio Frequency Level Meter Operation Screen (4-2-1[D])

Parameters set on any of the above Operation Screens are reflected in all. Configuring the abbreviated Spectrum Analyzer is as follows:

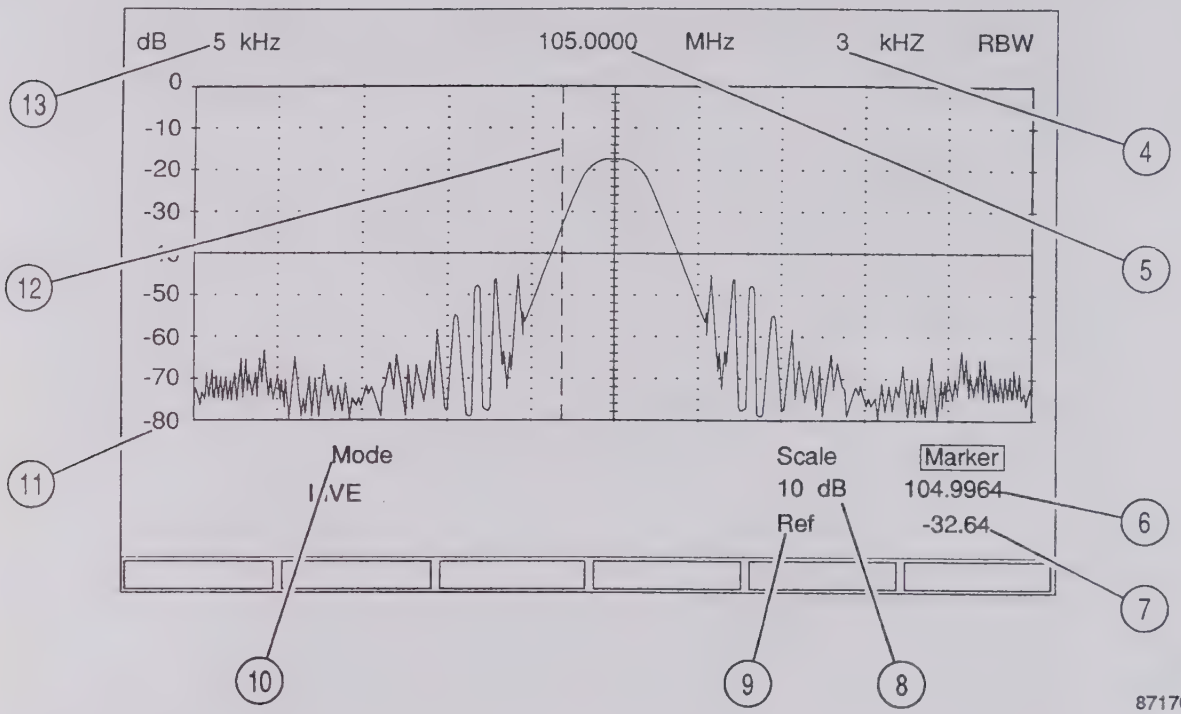


STEP	PROCEDURE

1. Select Scan Width (3). Selections include zero scan and:

1 kHz/Div	2 kHz/Div	5 kHz/Div
10 kHz/Div	20 kHz/Div	50 kHz/Div
100 kHz/Div	200 kHz/Div	500 kHz/Div
1 MHz/Div		

Pressing ZOOM Soft Function Key F1 accesses full screen Spectrum Analyzer, when cursor is on SCOPE/ANALYZER Prompt (1) of RF Generate Operation Screen and abbreviated Spectrum Analyzer is displayed. Available features and parameters are described below:



STEP	PROCEDURE

1. Set Center Frequency (5). Press Set Ref Soft Function Key F1 to set current Center Frequency as Reference Frequency.

2. Select Scan Width (13). Selections include zero scan and:

1 kHz/Div	2 kHz/Div	5 kHz/Div
10 kHz/Div	20 kHz/Div	50 kHz/Div
100 kHz/Div	200 kHz/Div	500 kHz/Div
1 MHz/Div		

3. Set Scale (8) as follows:

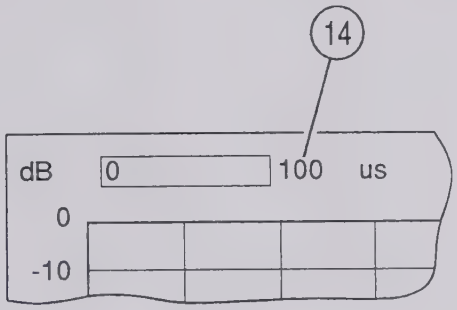
   - Press 10 dB Soft Function Key F1 to select 10 dB for Vertical Scale (11).
   - Press 2 dB Soft Function Key F1 to select 2 dB for Vertical Scale (11).

4. Select Mode (10) as follows:

   - Press PKHOLD Soft Function Key F1 to select Peak Hold Operation Mode.
   - Press LIVE Soft Function Key F2 to select Live Operation Mode.

- Press AVG Soft Function Key F3 to select Average Operation Mode.
- Press COMPARE Soft Function Key F4 to select Compare Operation Mode.
- Press RECALL Soft Function Key F5 to select Recall Operation Mode.
- Press STORE Soft Function Key F6 to select Store Operation Mode.

5. Activate Marker (12), as required, as follows:
   - With Cursor on Marker Position (6), press On/Off Soft Function Key F1.
   - Enter Desired Marker Position using DATA ENTRY Keys or DATA SCROLL Keys and/or DATA SCROLL Spinner.
6. Access Ref (9) Field to adjust Vertical Scale (11), as needed.



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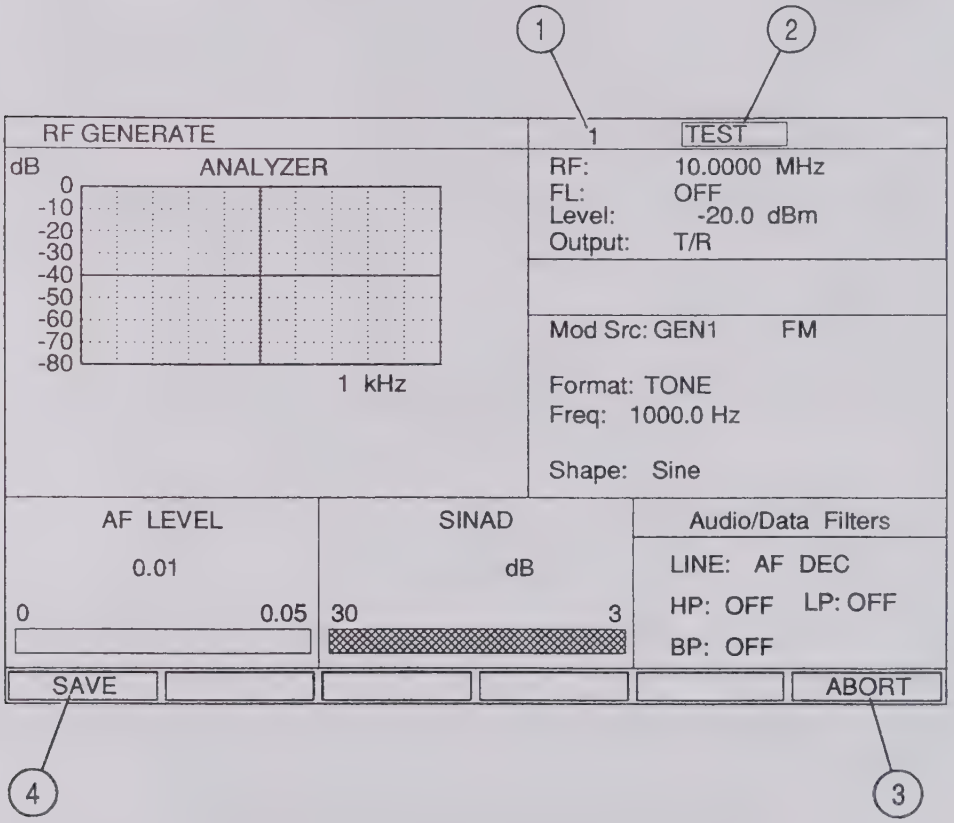
7. If Scan Width (13) is set to zero scan, enter Zero Scan Sweep (14). Selections include:

100 µs/Div	200 µs/Div	500 µs/Div
1 ms/Div	2 ms/Div	5 ms/Div
10 ms/Div	20 ms/Div	50 ms/Div
100 ms/Div		

G. STORE AND RECALL OPERATION

Pressing STORE Memory Key allows the operator to store up to 50 RF Generate Operation Screen configurations. Storage Locations 0 through 49 can be used to store a RF Generate Operation configuration, a RF Receive Operation configuration or a Duplex Operation configuration (Receive and Generate pair). Refer to 3-3-8(B) for information on the Setup List that displays all Memory Locations, operation types and associated Memory Location Labels (2).

STORE Operation for RF Generate Operation is as follows:



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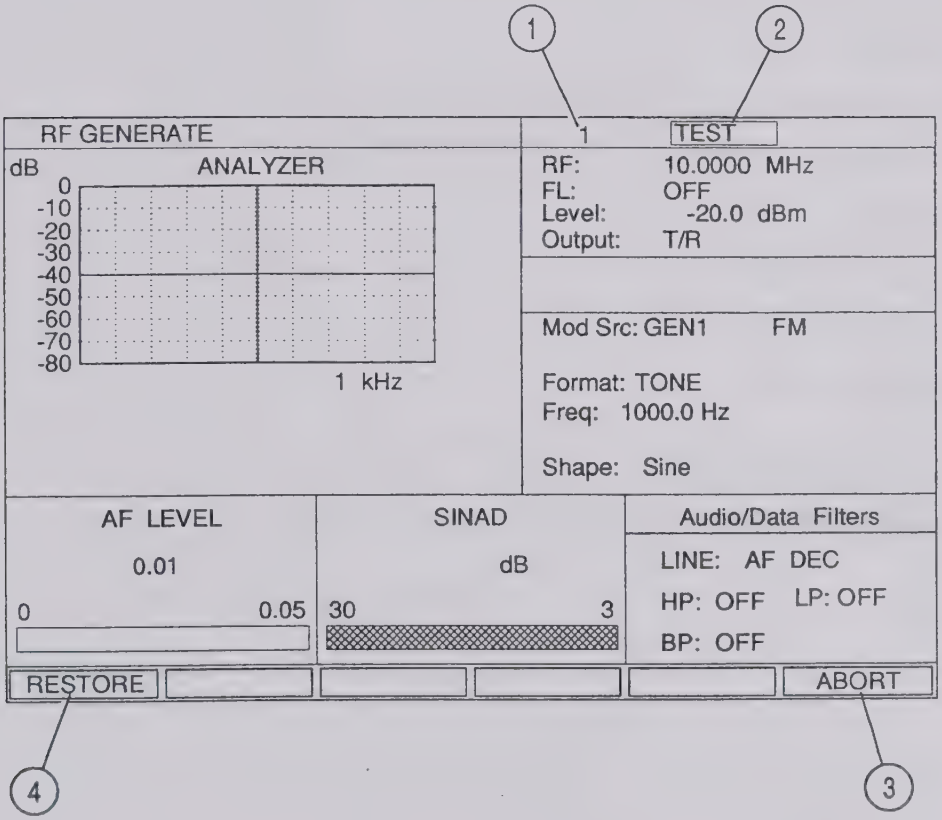
STEP	PROCEDURE

1. Press STORE MEMORY Key.
2. Enter Memory Location (1) value. Range is 0 to 49. Press ENTER Key.
3. If Memory Location Label (2) is desired, press ENTER Key, with Cursor on Memory Location Label (2). Enter Label using DATA ENTRY Keys. Label can be alphabetic and/or numeric characters. Press ENTER Key.
4. Press SAVE Soft Function Key F1 (4) to accept selections and save Setup. Press ABORT Soft Function Key F6 (3) to escape without saving Setup.

Pressing RCL Memory Key allows the operator to recall up to 100 previously stored operation screens. RF Receive, RF Generate or Dupex Operation Screen configurations and all be accessed from the RF Generate Operation Screen. Accessing anything other than an RF Generate Operation Screen configuration, automatically switches the COM-120A to the selected mode of operation. Refer to 3-3-8(B) for information on the Setup List that displays all Memory Locations, operation types and associated Memory Location Labels (2).

RECALL Operation for RF Generate Operation is as follows:



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STEP	PROCEDURE

1. Press RECALL MEMORY Key.
2. Enter Memory Location (1) value. Range is 0 to 49. Press ENTER Key.
3. Press RESTORE Soft Function Key F1 (4) to accept selections and recall Setup. Press ABORT Soft Function Key F6 (3) to escape without recalling Setup.

4-2-2 GENERATING FM MODULATED RF SIGNAL

The following procedure configures the RF Generate Operation Screen to transmit a 100 MHz FM Modulated RF Signal at the T/R Connector. The audio portion of the signal is a 1 kHz sine wave from Audio Generator 1. The deviation is set for 5 kHz. The Output Level is set to -50 dBm. The speaker is configured to play the internal modulated signal.

STEP	PROCEDURE

1. Set RF Field to ***100 MHz***.
2. Set Output Level to ***-50 dBm***.
3. Set Output to ***T/R***.
4. Select Audio Generator 1 (***GEN1***) for Modulation Source.
5. Set Modulation Type to ***FM***.
6. Set Deviation Level to ***5 kHz***.
7. Set Format to ***TONE***.
8. Set Tone Freq to ***1000.0 Hz***.
9. Set Shape to ***SINE***.
10. Access Filters Setup Menu. Set Speaker/Headphones Field to ***INT-MOD***. Return to RF Generate Operation Screen.
11. Set VOLUME Control for desired audio level.

4-2-3 GENERATING AM MODULATED RF SIGNAL

The following procedure configures the RF Generate Operation Screen to transmit a 100 MHz AM Modulated RF Signal at the T/R Connector. The audio portion of the signal is a 1 kHz sine wave from Audio Generator 1. The Modulation is set for 50%. The Output Level is set to -50 dBm. The speaker is configured to play the internal modulated signal.

STEP	PROCEDURE

1. Set RF Field to ***100 MHz***.
2. Set Output Level to ***-50 dBm***.
3. Set Output to ***T/R***.
4. Select Audio Generator 1 (***GEN1***) for Modulation Source.
5. Set Modulation Type to ***AM***.
6. Set Modulation Level to ***50%***.
7. Set Format to ***TONE***.
8. Set Tone Freq to ***1000.0 Hz***.
9. Set Shape to ***SINE***.
10. Access Filters Setup Menu. Set Speaker/Headphones Field to ***INT-MOD***. Return to RF Generate Operation Screen.
11. Set VOLUME Control for desired audio level.

4-2-4 GENERATING PM MODULATED RF SIGNAL

The following procedure configures the RF Generate Operation Screen to transmit a 100 MHz PM Modulated RF Signal at the T/R Connector. The audio portion of the signal is a 1 kHz sine wave from Audio Generator 1. The deviation is set for 5 Radians. The Output Level is set to -50 dBm.

STEP	PROCEDURE

1. Set RF Field to ***100 MHz***.
2. Set Output Level to ***-50 dBm***.
3. Set Output to ***T/R***.
4. Select Audio Generator 1 (***GEN1***) for Modulation Source.
5. Set Modulation Type to ***PM***.
6. Set Deviation Level to ***5.0 Rad***.
7. Set Format to ***TONE***.
8. Set Tone Freq to ***1000.0 Hz***.
9. Set Shape to ***SINE***.
10. Access Filters Setup Menu. Set Speaker/Headphones Field to ***INT-MOD***. Return to RF Generate Operation Screen.
11. Set VOLUME Control for desired audio level.

4-2-5 GENERATING DCS CODED RF SIGNAL

The following procedure configures the RF Generate Operation Screen to transmit a 100 MHz RF Signal FM Modulated with a DCS Code at the T/R Connector. The deviation is set for 5 kHz. The Output Level is set to -50 dBm.

STEP	PROCEDURE

1. Set RF Field to ***100 MHz***.
2. Set Output Level to ***-50 dBm***.
3. Set Output to ***T/R***.
4. Select DATA Generator (***DATA***) for Modulation Source.
5. Set Modulation Type to ***AM***.
6. Set Deviation Level to ***5.0 kHz***.
7. Set Format to ***DCS***.
8. Set Code to ***114***.

4-2-6 GENERATING DTMF CODED RF SIGNAL

The following procedure configures the RF Generate Operation Screen to transmit a 100 MHz RF Signal FM Modulated with DTMF Code at the T/R Connector. The deviation is set for 5 kHz. The Output Level is set to -50 dBm. The signal is set to run in a continuous loop.

STEP	PROCEDURE

1. Set RF Field to ***100 MHz***.
2. Set Output Level to ***-50 dBm***.
3. Set Output to ***T/R***.
4. Select DTMF Generator 1 (***DTMF***) for Modulation Source.
5. Set Modulation Type to ***FM***.
6. Set Deviation Level to ***5.0 kHz***.
7. Enter desired DTMF Code.
8. Set Mark TIme to ***70 msec***.
9. Set Space Time to ***70 msec***.
10. Set Pause Time to ***70 msec***.

4-2-7 GENERATING RF SIGNAL USING EXTERNAL MODULATION

The following procedure configures the RF Generate Operation Screen to transmit a 100 MHz RF Signal FM Modulated with External Modulation Source of 1 kHz. The deviation is set for 5 kHz by adjusting the input level of the Modulation Signal. The Output Level is set to -50 dBm.

STEP	PROCEDURE

1. Set RF Field to ***100 MHz***.
2. Set Output Level to ***-50 dBm***.
3. Set Output to ***T/R***.
4. Select External Modulation (***EXT***) for Modulation Source.
5. Set Modulation Type to ***FM***.
6. Set Deviation Range to ***LOW***.
7. Configure RF Generate Operation Screen for active ***SCOPE***.
8. Set Oscilloscope Sweep for ***1 ms***.
9. Set Oscilloscope Source for ***Scope/DVM-AC***.
10. Connect External Modulation Source to SCOPE/DVM Connector.
11. Set External Modulation Source for 2.5 Vp. This setting will produce 5 kHz Deviation independent of signal shape.
12. Connect External Modulation Source to EXT MOD Connector.

4-2-8 GENERATING MICROPHONE MODULATED RF SIGNAL

The following procedure configures the RF Generate Operation Screen to transmit a 100 MHz Microphone Modulated RF Signal at the T/R Connector. The Microphone is connected to the MIC/ACC Connector. The Output Level is set to -50 dBm.

STEP	PROCEDURE

1. Set RF Field to ***100 MHz***.
2. Set Output Level to ***-50 dBm***.
3. Set Output to ***T/R***.
4. Select Microphone (***MIC***) for Modulation Source.
5. Set Modulation Type to ***FM***.

4-2-9 MEASURING RECEIVER CENTER FREQUENCY

The following procedure configures the RF Generate Operation Screen to Measure the center frequency for a receiver.

STEP	PROCEDURE

1. Set RF Field to UUT Receiver stated Center Frequency.
2. Set Output Level to ***-50 dBm***.
3. Set Output to ***T/R***.
4. Select Audio Generator 1 (***GEN1***) for Modulation Source.
5. Set Modulation Type to ***FM***.
6. Set Deviation Level to ***3 kHz***.
7. Set Format to ***TONE***.
8. Set Tone Freq to ***1000.0 Hz***.
9. Set Shape to ***SINE***.
10. Connect T/R Connector to UUT Antenna Connector. Connect UUT Audio Out Connector to AUDIO/DATA IN Connector.
11. Adjust UUT Audio Output for maximum output.
12. Measure output on AF LEVEL Meter.
13. Adjust UUT Audio Output for 60% of maximum setting
14. Set AF DECODE/SINAD Filter Line for ***300 Hz*** HPF and ***4 kHz*** LPF.
15. Set SINAD= to ***12 dB***.
16. Press S= On/Off Soft Function Key to activate SINAD Search Function.
17. Once 12 dB Point is reached, deactivate SINAD Search Function.
18. Adjust RF Field for highest SINAD Meter reading.
19. Final RF Field reading is UUT Center Frequency.

4-2-10 MEASURING RECEIVER SENSITIVITY

The following procedure configures the RF Generate Operation Screen to measure Receiver Sensitivity.

STEP	PROCEDURE

1. Perform para 4-2-10 to determine UUT Center Frequency.
2. Set RF Field for UUT Center Frequency.
3. Set SINAD= to 10 dB or 12 dB as specified by Receiver Manufacturer.
4. Press S= On/Off Soft Function Key F6 to activate SINAD Search Function.
5. Once Level settles press S= On/Off Soft Function Key F6 to deactivate SINAD Search Function. Level is Receiver Sensitivity Level.

4-2-11 MEASURING RECEIVER SELECTIVITY

The following procedure configures the RF Generate Operation Screen to measure Receiver Selectivity.

STEP	PROCEDURE

1. Perform para 4-2-10 to determine UUT Center Frequency.
2. Set RF Field for UUT Center Frequency.
3. Set Level as specified by Receiver Manufacturer.
4. Adjust UUT Squelch as high as possible but with Squelch still broken.
5. Offset RF by amount specified by Receiver Manufacturer.
6. Adjust Level until UUT squelch is broken. Difference in Original Level and adjusted Level is Receiver Selectivity.

4-2-12 MEASURING RECEIVER AUDIO OUTPUT LEVEL

The following procedure configures the RF Generate Operation Screen to measure Receiver Audio Output Level.

STEP	PROCEDURE

1. Set RF Field for UUT Center Frequency.
2. Set Output Level to ***-50 dBm***.
3. Set Output to ***T/R***.
4. Select Audio Generator 1 (***GEN1***) for Modulation Source.
5. Set Modulation Type to ***FM***.

STEP	PROCEDURE

6. Set Deviation Level to ***3 kHz***.
7. Set Format to ***TONE***.
8. Set Tone Freq to ***1000.0 Hz***.
9. Set Shape to ***SINE***.
10. Connect T/R Connector to UUT Antenna Connector. Connect UUT Audio Out Connector to AUDIO/DATA IN Connector.
11. Adjust UUT Audio Output for desired output.
12. On Full Screen Audio Frequency Level Meter, set Range to value where bar appears.
13. Set Reading for desired units. Set Impedance for dBm reading and attach external load as required.
14. Audio Frequency Level Meter Reading is Audio Output Level of Receiver.

4-2-13 MEASURING MODULATION ACCEPTANCE BANDWIDTH

The following procedure configures the RF Generate Operation Screen to measure Receiver Modulation Acceptance Bandwidth.

STEP	PROCEDURE

1. Perform para 4-2-10 to determine UUT Center Frequency.
2. Set RF Field for UUT Center Frequency.
3. Set SINAD= to 12 dB.
4. Press S= On/Off Soft Function Key F6 to activate SINAD Search Function.
5. Once Level settles press S= On/Off Soft Function Key F6 to deactivate SINAD Search Function.
6. Increase Level 6 dB.
7. Increase Deviation Level until SINAD Meter Reads 12 dB. Modulation Acceptance Bandwidth is twice Deviation Level.

4-2-14 MEASURING RECEIVER IF BANDWIDTH

The following procedure configures the RF Generate Operation Screen to measure Receiver IF Bandwidth.

STEP PROCEDURE

1. Set RF Field to UUT Receiver Center Frequency.
2. Set Output Level to ***-50 dBm***.
3. Set Output to ***T/R***.
4. Select Audio Generator 1 (***GEN1***) for Modulation Source.
5. Set Modulation Type to ***FM***.
6. Set Deviation Level to ***3 kHz***.
7. Set Format to ***TONE***.
8. Set Tone Freq to ***1000.0 Hz***.
9. Set Shape to ***SINE***.
10. Connect T/R Connector to UUT Antenna Connector. Connect UUT Audio Out Connector to AUDIO/DATA IN Connector.
11. Set Receiver Squelch to lowest setting.
12. Set AF DECODE/SINAD Filter Line for ***300 Hz*** HPF and ***4 kHz*** LPF.
13. Set SINAD= to ***12 dB***.
14. Press S= On/Off Soft Function Key to activate SINAD Search Function.
15. Once 12 dB Point is reached, deactivate SINAD Search Function. Current Level is Reference Sensitivity.
18. Increase Level by 60 dB.
19. Increase RF Field until SINAD Meter reads 12 dB. Resulting frequency is Upper Frequency.
20. Decrease RF Field past Center Frequency until SINAD Meter reads 12 dB. Resulting frequency is Lower Frequency.
21. Subtract Lower Frequency from Upper Frequency to obtain Receiver IF Bandwidth.

4-3 RF RECEIVE OPERATION

Pressing the REC MODE Key accesses the RF Receive Operation Screen. The purpose of the RF Receive Mode is for the COM-120A to act as a receiver and test a transmitter. What this section does is to provide guidance in configuring the COM-120A to perform tests on the transmitter.

Configuring the RF Receive Operation Screen is covered in a very generic sense in para 4-3-1. This section is provided to explain how each of the active fields are edited and what selections are available. It is not designed to perform a specific test, but instead is provided as a reference for operating the RF Receive Operation Screen. To fully understand this section, the operator must read and understand para 3-3-2 and para 4-1.

Starting with para 4-3-2, specific Operations and Tests are provided in a step-by-step procedure. Specific editing instructions for configuring the RF Receive Operation Procedure are not provided. It is assumed that the operator has read and understands para 4-3-1. A list of Operations available with the RF Receive Operation Screen follows:

Section	Title	Page
4-3-1	RF Receive Operation	4-44
4-3-2	Receiving FM Modulated RF Signal	4-90
4-3-3	Receiving AM Modulated RF Signal	4-91
4-3-4	Receiving PM Modulated RF Signal	4-92
4-3-5	Receiving DCS Coded RF Signal	4-93
4-3-6	Receiving DTMF Coded RF Signal	4-94
4-3-7	Measuring Transmitter FM Deviation	4-95
4-3-8	Measuring Transmitter AM Modulation	4-96
4-3-9	Measuring Transmitter Phase Modulation	4-97
4-3-10	Measuring Transmitter Power	4-98
4-3-11	Measuring Transmitter Frequency Error	4-99
4-3-12	Measuring Transmitter Audio Frequency	4-100
4-3-13	Measuring Transmitter SINAD	4-101
4-3-14	Measuring Transmitter Distortion	4-102

4-3-1 RF RECEIVE GENERAL OPERATION

A. RF RECEIVE OPERATION SCREEN

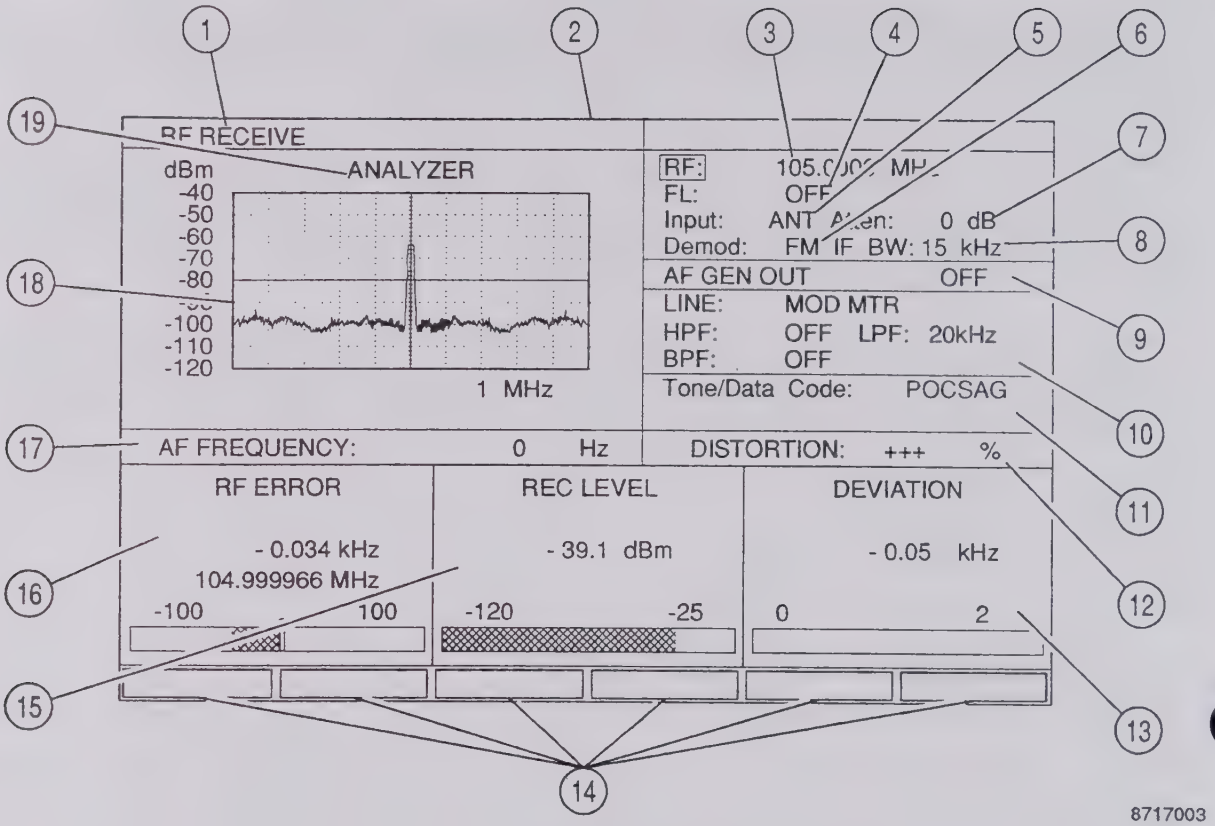


Figure 4-2 RF Receive Operation Screen

STEP	PROCEDURE

1. Enter desired frequency in RF Field (3). Frequency range is .250 to 1000 MHz. Activate additional functions as required as follows:

   - To operate with Δ Function active:
     - Press Δ On/Off Soft Function Key F2 until Δ prompt appears.
     - Press Δ = Soft Function Key F1 to set RF Field change increment. Range is 0 to 500 MHz. Press RETURN Soft Function Key F6 to close window.
     - To deactivate Δ Function, press Δ On/Off Soft Function Key F2 until Δ prompt no longer appears beside RF Field
   - To Operate with Scan Function, press SCAN Soft Function Key F3 to open Scan Configuration Window. Once Scan Configuration Window is opened:

- Move Cursor to From Field. Enter starting Frequency List Number.
- Move Cursor to To Field. Enter ending Frequency List Number.
- Move Cursor to Increment Field. Enter Frequency List Number Change Increment.
- Enter Pause Time or Delay Time. Range for both is 0 to 9.5 sec with .5 sec step. When Pause Time is not set to 0, Delay Time Field is blanked.
- If single sweep is desired, press SINGLE Soft Function Key F3. If continuous sweep is desired, press START Soft Function Key F1. To stop Sweep Function, press STOP Soft Function Key F2. To resume Sweep Operation once stopped, press RESUME Soft Function Key F5.
- Press RETURN Soft Function Key F6 to exit Sweep Function.

- To Operate with Sweep Operation, press SWEEP Soft Function Key F4 to open Sweep Configuration Window. Once Sweep Configuration Window is opened:
  - Move Cursor to Start Field. Enter Start Frequency.
  - Move Cursor to Stop Field. Enter Stop Frequency.
  - Move Cursor to Increment Field. Enter Increment.
  - Enter Pause Time or Delay Time. Range for both is 0 to 9.5 sec with .5 sec step. When Pause Time is not set to 0, Delay Time Field is blanked.
  - If single sweep is desired, press SINGLE Soft Function Key F3. If continuous sweep is desired, press START Soft Function Key F1. To stop Sweep Function, press STOP Soft Function Key F2. To resume Sweep Operation, once stopped, press RESUME Soft Function Key F5.
  - Press RETURN Soft Function Key F6 to exit Sweep Function.
- To Operate with RF Generate, RF Receive and Spectrum Analyer RF Frequencies locked, press LOCK/UNLOCK Soft Function Key until *L* is displayed beside RF Field and UNLOCK is displayed for F5 definition. Press UNLOCK Soft Function Key F5 to set LOCK Function off.

2. If Frequency List Operation is desired instead of entering frequency in RF Field (3), select Frequency List (4) Setting as follows:
   - Select Desired Frequency List (4) Type as follows:
     - Press T-Fwd Soft Function Key F2 to select Trunking Forward Channel List.
     - Press T-Rvs Soft Function Key F3 to select Trunking Reverse Channel List.
     - Press C-Fwd Soft Function Key F4 to select Cellular Forward Channel List.
     - Press C-Rvs Soft Function Key F5 to select Cellular Reverse Channel List.

- Press FL Soft Function Key F6 to select User Defined Frequency List.

- Press ON/OFF Soft Function Key F1 to active Frequency List (4) Setting.

- If Cellular Channel List or User Defined Frequency List is selected, select channel/frequency number. Range of cellular channels is 1 to 1023. Range of Frequency List is 0 to 99.

- If Trunking Channel List is selected, select channel number. Select Frequency Band by moving cursor to Frequency Band Field and pressing ENTER. Select desired Frequency Band using DATA SCROLL Keys or DATA SCROLL Spinner. Press ENTER Key.

NOTE: Refer to para 3-3-8(A) for information on User Defined Frequency List.

4. Select Input (5) Connector as follows:

   - Press T/R Soft Function Key F1 to select T/R Connector.

   - Press ANT Soft Function Key F2 to select ANTENNA Connector .

5. Select Attenuation (7) as follows:

   - Press 30 dB Soft Function Key F1 to select 30 dB attenuation for Input Signal.

   - Press 0 dB Soft Function Key F2 to select no attenuation for Input Signal.

6. Select Demodulation Type (6) as follows:

   - Press FM Soft Function Key F1 to select FM demodulation.

   - Press AM dB Soft Function Key F2 to select AM demodulation.

   - Press PM dB Soft Function Key F3 to select PM demodulation.

7. Select IF Bandwidth (8) as follows:

   - Press 300 kHz Soft Function Key F1 to select 300 kHz IF Bandwidth Filter.

   - Press 15 kHz Soft Function Key F2 to select 15 kHz IF Bandwidth Filter.

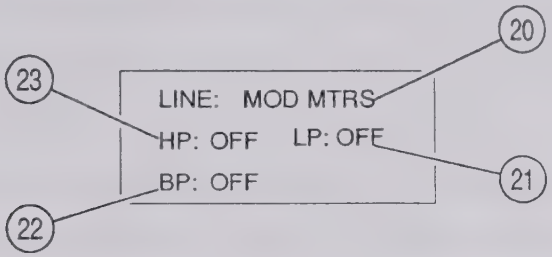
   For following guidelines, ΔF is Frequency Deviation in Hz, Φ is Phase Deviation in Radians, F_m is the Tone Modulation Frequency in Hz and IF is Minimum IF Filter Bandwidth. General Guidelines for IF Filter Selection are as follows:

   For FM Modulated Signals: $IF = 4(\Delta F + F_m)$

   For PM Modulated Signals: $IF = 4F_m(\Phi + 1)$

   For AM Modulated Signals: $IF = 15$ kHz, for $F_m \leq 1$ kHz

8. If AF Generator sources are required, refer to para 4-7 for editing information.



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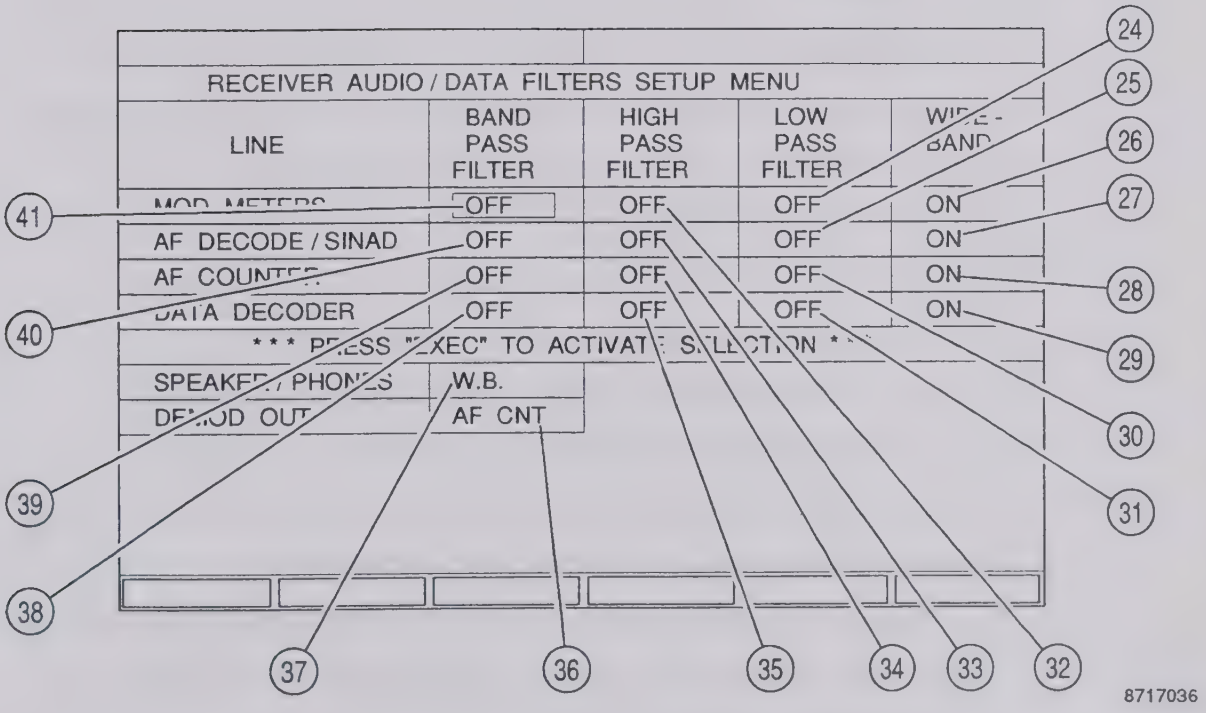

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9. If Audio/Data Filters are required for operation of Meters or Speaker, configure and activate as follows:

   NOTE: High-Pass Filter/Low-Pass Filter combination and Bandpass Filter cannot operate simultaneously on same Filter Line.

   - With cursor on Filter Line (20), press CONFIG Soft Function Key F6 to access RF Receiver Filters Menu.
   - Select MOD METERS Bandpass Filter Field (41) setting as follows:
     - Press OFF Soft Function Key F1 to set Filter to OFF.
     - Press C-MSG Soft Function Key F2 to select C-Message Weighted Filter.

- Select MOD METERS High-Pass Filter Field (32) setting as follows:
  - Press OFF Soft Function Key F1 to set Filter to OFF.
  - Press 300 Hz Soft Function Key F2 to activate 300 Hz High-Pass Filter.
  - Press 4 kHz Soft Function Key F3 to activate 4 kHz High-Pass Filter.
- Select MOD METERS Low-Pass Filter Field (24) setting as follows:
  - Press OFF Soft Function Key F1 to set Filter to OFF.
  - Press 300 Hz Soft Function Key F2 to activate 300 Hz Low-Pass Filter.
  - Press 4 kHz Soft Function Key F3 to activate 4 kHz Low-Pass Filter.
  - Press 20 kHz Soft Function Key F4 to activate 20 kHz Low-Pass Filter.
- Select AF DECODE/SINAD Bandpass Filter Field (40) setting as follows:
  - Press OFF Soft Function Key F1 to set Filter to OFF.
  - Press C-MSG Soft Function Key F2 to select C-Message Weighted Filter.
- Select AF DECODE/SINAD High-Pass Filter Field (33) setting as follows:
  - Press OFF Soft Function Key F1 to set Filter to OFF.
  - Press 300 Hz Soft Function Key F2 to activate 300 Hz High-Pass Filter.
  - Press 4 kHz Soft Function Key F3 to activate 4 kHz High-Pass Filter.
- Select AF DECODE/SINAD Low-Pass Filter Field (25) setting as follows:
  - Press OFF Soft Function Key F1 to set Filter to OFF.
  - Press 300 Hz Soft Function Key F2 to activate 300 Hz Low-Pass Filter.
  - Press 4 kHz Soft Function Key F3 to activate 4 kHz Low-Pass Filter.
  - Press 20 kHz Soft Function Key F4 to activate 20 kHz Low-Pass Filter.
- Select AF COUNTER Bandpass Filter Field (39) setting as follows:
  - Press OFF Soft Function Key F1 to set Filter to OFF.
  - Press C-MSG Soft Function Key F2 to select C-Message Weighted Filter.
- Select AF COUNTER High-Pass Filter Field (34) setting as follows:
  - Press OFF Soft Function Key F1 to set Filter to OFF.
  - Press 300 Hz Soft Function Key F2 to activate 300 Hz High-Pass Filter.

- Press 4 kHz Soft Function Key F3 to activate 4 kHz High-Pass Filter.

- Select AF COUNTER Low-Pass Filter Field (30) setting as follows:
  - Press OFF Soft Function Key F1 to set Filter to OFF.
  - Press 300 Hz Soft Function Key F2 to activate 300 Hz Low-Pass Filter.
  - Press 4 kHz Soft Function Key F3 to activate 4 kHz Low-Pass Filter.
  - Press 20 kHz Soft Function Key F4 to activate 20 kHz Low-Pass Filter.
- Select DATA DECODER Bandpass Filter Field (38) setting as follows:
  - Press OFF Soft Function Key F1 to set Filter to OFF.
  - Press C-MSG Soft Function Key F2 to select C-Message Weighted Filter.
- Select DATA DECODER High-Pass Filter Field (35) setting as follows:
  - Press OFF Soft Function Key F1 to set Filter to OFF.
  - Press 300 Hz Soft Function Key F2 to activate 300 Hz High-Pass Filter.
  - Press 4 kHz Soft Function Key F3 to activate 4 kHz High-Pass Filter.
- Select DATA DECODER Low-Pass Filter Field (31) setting as follows:
  - Press OFF Soft Function Key F1 to set Filter to OFF.
  - Press 300 Hz Soft Function Key F2 to activate 300 Hz Low-Pass Filter.
  - Press 4 kHz Soft Function Key F3 to activate 4 kHz Low-Pass Filter.
  - Press 20 kHz Soft Function Key F4 to activate 20 kHz Low-Pass Filter.
- Press EXEC Soft Function Key F5 to Execute all edits.
- Select Speaker/Headphones Filter Field (37) setting as follows:
  - Press OFF Soft Function Key F1 to set Filter to OFF.
  - Press C-MSG Soft Function Key F2 to select C-Message Weighted Filter.
  - Press W.B. Soft Function Key F3 to select no filtering.
  - Press AUD-GEN Soft Function Key F4 to route Audio Signal Internal Modulation Sources to Speaker.
- Select DEMOD OUT Connector Filter Field (36) setting as follows:
  - Press AF-CNT Soft Function Key F1 to access AF Counter Signal.

- Press DET-OUT Soft Function Key F2 to access Detector Signal.
- Press C-MSG Soft Function Key F3 to select Detector Signal through C-Message Weighted Filter.
- Press DATA DEC Soft Function Key F4 to access Data Decoder Signal.
- Press AF DECD Soft Function Key F5 to access AF Decoder/SINAD Signal.
- Press MOD MTR Soft Function Key F6 to access Modulation Meters Signal.

- Press RETURN Soft Function Key F6, when displayed, to return to RF Receive Operation Screen.
- To display different Filter Line (20) settings:
  - Press MOD MTR Soft Function Key F1 to display MOD METERS Filter Settings.
  - Press AF DEC Soft Function Key F2 to display AF DECODE/SINAD Filter Settings.
  - Press AF CNT Soft Function Key F3 to display AF COUNTER Filter Settings.
  - Press DAT DEC Soft Function Key F4 to display DATA DECODER Filter Settings.
  - Press SPKR Soft Function Key F5 to display Speaker/Headphones Filter Settings.

10. Select Tone/Data Type for TONE/DATA CODE Field as required. Press DECODE Soft Function Key F2 to activate decoding.

11. Select desired DISTORTION/SINAD/MODULATION Reading (12) as follows:
    - Press SINAD Soft Function Key F2 to select SINAD Reading.
    - Press DIST Soft Function Key F3 to select DISTORTION Reading.
    - Press DEV Soft Function Key F4 to select Modulation Meter for Demodulation Type (6).

12. Refer to para 4-3-1(B) for information on configuring SINAD Meter. Refer to para 4-3-1(C) for information on configuring Distortion Meter. Refer to para 4-3-1(D) for information on configuring FM Deviation Meter. Refer to para 4-3-1(E) for information on configuring AM Modulation Meter. Refer to para 4-3-1(F) for information on configuring Phase Modulation Meter. Select desired Meter Operation as follows:
    - Press SINAD Soft Function Key F2 to select SINAD Reading.
    - Press DIST Soft Function Key F3 to select DISTORTION Reading.

- Press DEV Soft Function Key F4 to select Modulation Meter for Demodulation Type (6).

13. Refer to para 4-3-1(G) for information on configuring RF POWER Meter and para 4-3-1(H) for information on configuring Received Level Meter.

14 Refer to para 4-3-1(I) for information on configuring RF ERROR Meter.

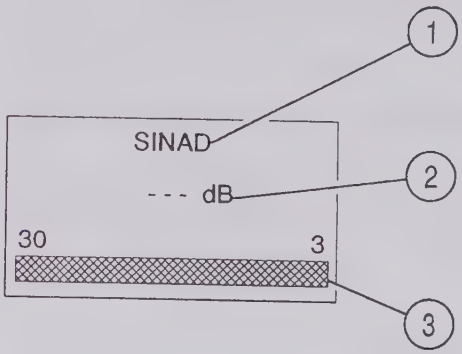
15. Refer to para 4-3-1(J) for information on configuring AF FREQUENCY Meter.

16. Refer to para 4-3-1(K) for information on configuring RF Receiver Oscilloscope and para 4-3-1(L) for information on configuring RF Generator Spectrum Analyzer. If desired instrument is not shown, press ANALY/SCOPE Soft Function Key F2.

B. SINAD METER

The SINAD Meter for the RF Receiver measures SINAD for a 1 kHz tone demodulated from an RF Signal. Filtering, for the signal passed to the SINAD Meter, is provided by the Audio/Data Filters. Refer to para 4-3-1(A) for information on configuring filters available.

Configure and operate the SINAD Meter as follows:



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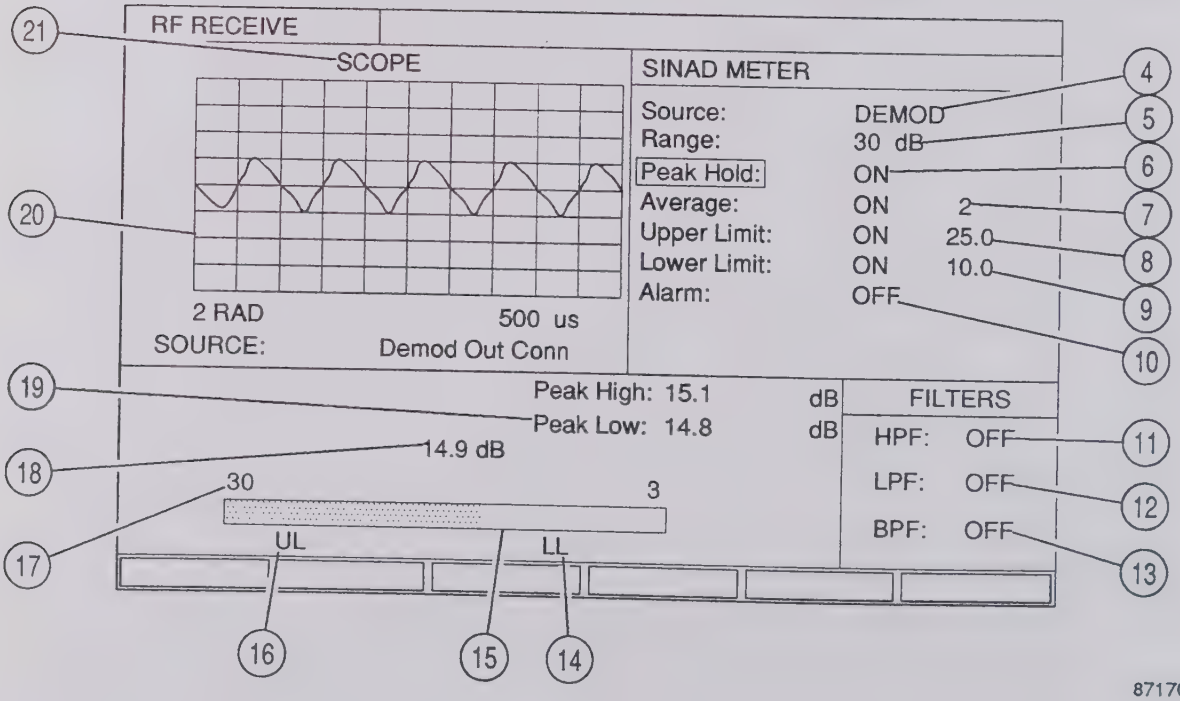

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STEP	PROCEDURE

1. With cursor on SINAD/Distortion/Modulation Meter Label (1), press ZOOM Soft Key F1. Full Screen SINAD Meter is displayed.

2. Select Range (5) as follows:

   - Press 15 dB Soft Function Key F1 to select 15 dB Range (5).
   - Press 30 dB Soft Function Key F2 to select 30 dB Range (5).
   - Press AUTO Soft Function Key F3 to select Autorange for Range (5).

3. If Peak Hold Function is desired, configure as follows:

   - With cursor on Peak Hold (6), press OFF/ON Soft Function Key F1 until Peak Hold (6) displays ***ON***.
   - Peak Hold Function can be reset as desired by pressing RST PK Soft Function Key F5 where displayed.
   - Set Peak Hold Function to OFF by pressing OFF/ON Soft Function Key F1 until Peak Hold (6) displays ***OFF***.

4. If Average Function is desired, configure as follows:

   - With cursor on Average (7), press OFF/ON Soft Function Key F1 until Average (7) displays ***ON*** and Sample Number appears.
   - Enter Sample Number. Range is 2 to 10.
   - Set Average Function to OFF by pressing OFF/ON Soft Function Key F1 until Average (7) displays ***OFF***.

5. If Upper Limit Function is desired, configure as follows:

   - With cursor on Upper Limit (8), press OFF/ON Soft Function Key F1 until Upper Limit (8) displays ***ON*** and Limit Value appears.
   - Enter Limit Value. Range is 0 to 30.
   - Set Upper Limit Function to OFF by pressing OFF/ON Soft Function Key F1 until Upper Limit (8) displays ***OFF***.

6. If Lower Limit Function is desired, configure as follows:

   - With cursor on Lower Limit (9), press OFF/ON Soft Function Key F1 until Lower Limit (9) displays ***ON*** and Limit Value appears.
   - Enter Limit Value. Range is 0 to 30.
   - Set Lower Limit Function to OFF by pressing OFF/ON Soft Function Key F1 until Lower Limit (9) displays ***OFF***.

:EDURE

ure as follows:

; OFF/ON Soft Function Key F1 until Alarm (10)

·essing OFF/ON Soft Function Key F1 until

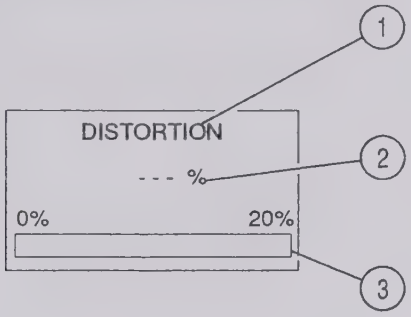
on on configuring RF Receive Oscilloscope and
ıfiguring RF Receive Spectrum Analyzer. If
ess ANALY/SCOPE Soft Function Key F2.

unction Key F6 to return to RF Receive Operation
)DE Key to return to RF Receive Operation

C. DISTORTION METER

The Distortion Meter for the RF Receiver measures Distortion for a 1 kHz tone demodulated from an RF Signal. Filtering, for the signal passed to the Distortion Meter, is provided by the Audio/Data Filters. Refer to para 4-3-1(A) for information on configuring filters available.

Configure and operate the Distortion Meter as follows:



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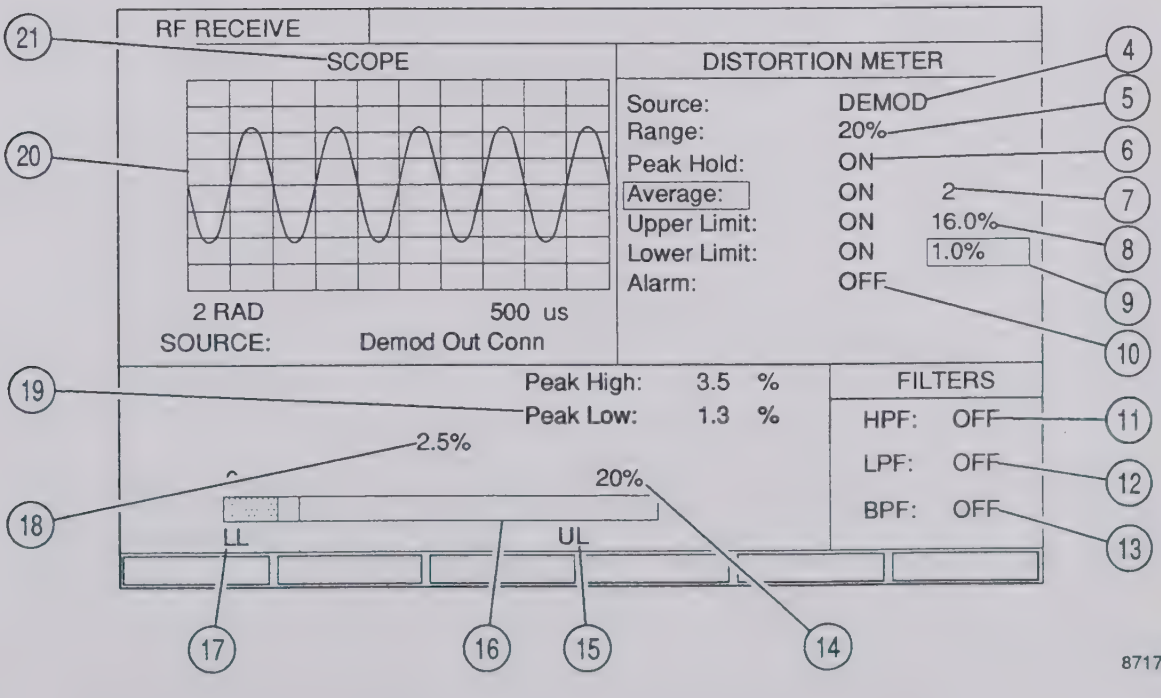


8717050

STEP PROCEDURE

1. With cursor on SINAD/Distortion/Modulation Meter Label (1), press ZOOM Soft Key F1. Full Screen Distorion Meter is displayed.

2. If Peak Hold Function is desired, configure as follows:

   - With cursor on Peak Hold (6), press OFF/ON Soft Function Key F1 until Peak Hold (6) displays ***ON***.
   - Peak Hold Function can be reset as desired by pressing RST PK Soft Function Key F5 where displayed.
   - Set Peak Hold Function to OFF by pressing OFF/ON Soft Function Key F1 until Peak Hold (6) displays ***OFF***.

3. If Average Function is desired, configure as follows:

   - With cursor on Average (7), press OFF/ON Soft Function Key F1 until Average (7) displays ***ON*** and Sample Number appears.
   - Enter Sample Number. Range is 2 to 10.
   - Set Average Function to OFF by pressing OFF/ON Soft Function Key F1 until Average (7) displays ***OFF***.

4. If Upper Limit Function is desired, configure as follows:

   - With cursor on Upper Limit (8), press OFF/ON Soft Function Key F1 until Upper Limit (8) displays ***ON*** and Limit Value appears.
   - Enter Limit Value. Range is 0% to 20%.
   - Set Upper Limit Function to OFF by pressing OFF/ON Soft Function Key F1 until Upper Limit (8) displays ***OFF***.

5. If Lower Limit Function is desired, configure as follows:

   - With cursor on Lower Limit (9), press OFF/ON Soft Function Key F1 until Lower Limit (9) displays ***ON*** and Limit Value appears.
   - Enter Limit Value. Range is 0% to 20%.
   - Set Lower Limit Function to OFF by pressing OFF/ON Soft Function Key F1 until Lower Limit (9) displays ***OFF***.

6. If Alarm Function is desired, configure as follows:

   - With cursor on Alarm (10), press OFF/ON Soft Function Key F1 until Alarm (10) displays ***ON***.
   - Set Alarm Function to OFF by pressing OFF/ON Soft Function Key F1 until Alarm (10) displays ***OFF***.

STEP	PROCEDURE

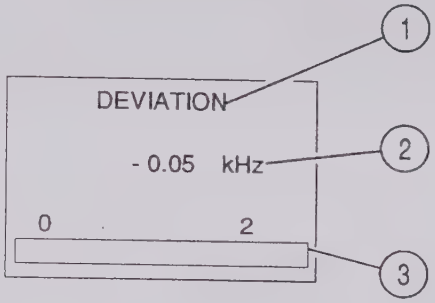
7. Refer to para 4-3-1(K) for information on configuring RF Receive Oscilloscope and para 4-3-1(L) for information on configuring RF Receive Spectrum Analyzer. If desired instrument is not shown, press ANALY/SCOPE Soft Function Key F2.

8. If displayed, press RETURN Soft Function Key F6 to return to RF Receive Operation Screen. Alternately, press REC MODE Key to return to RF Receive Operation Screen.

D. FM DEVIATION METER

The FM Deviation Meter for the RF Receiver measures FM Deviation for an RF Signal. Filtering, for the signal passed to the FM Deviation Meter, is provided by the Audio/Data Filters. Refer to para 4-3-1(A) for information on configuring filters available.

Configure and operate the FM Deviation Meter as follows:



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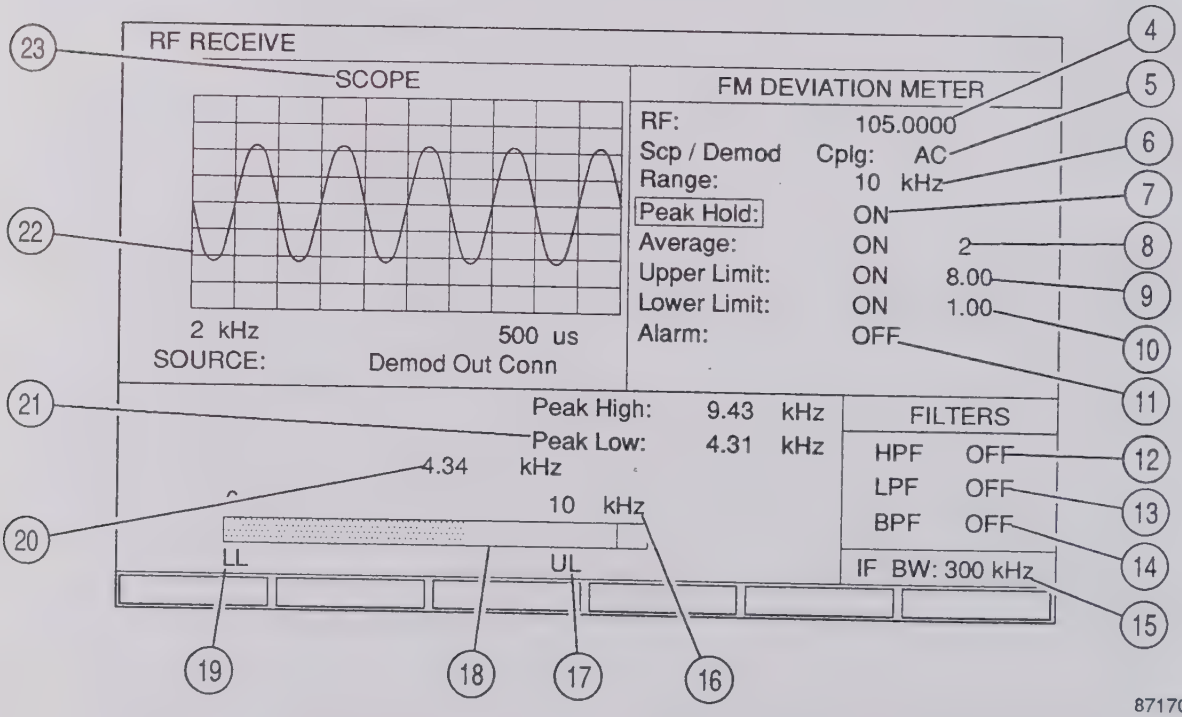


8717048

STEP	PROCEDURE

1. With cursor on SINAD/Distortion/Modulation Meter Label (1), press ZOOM Soft Key F1. Full Screen FM Deviation Meter is displayed.

2. Enter new frequency in RF Field (4) as needed.

3. Select Scope/DEMOD Connector Coupling (5) as follows:

   - Press AC Soft Function Key F1 to select AC Coupling
   - Press DC Soft Function Key F2 to select DC Coupling.

4. Select Range (6). Selections include Autorange, 2, 5, 10, 20, 50 or 100 kHz.

5. If Peak Hold Function is desired, configure as follows:

   - With cursor on Peak Hold (7), press OFF/ON Soft Function Key F1 until Peak Hold (7) displays ***ON***.
   - Peak Hold Function can be reset as desired by pressing RST PK Soft Function Key F5 where displayed.
   - Set Peak Hold Function to OFF by pressing OFF/ON Soft Function Key F1 until Peak Hold (7) displays ***OFF***.

6. If Average Function is desired, configure as follows:

   - With cursor on Average (8), press OFF/ON Soft Function Key F1 until Average (8) displays ***ON*** and Sample Number appears.
   - Enter Sample Number. Range is 2 to 10.
   - Set Average Function to OFF by pressing OFF/ON Soft Function Key F1 until Average (8) displays ***OFF***.

7. If Upper Limit Function is desired, configure as follows:

   - With cursor on Upper Limit (9), press OFF/ON Soft Function Key F1 until Upper Limit (9) displays ***ON*** and Limit Value appears.
   - Enter Limit Value. Range is 0 to 100 kHz.
   - Set Upper Limit Function to OFF by pressing OFF/ON Soft Function Key F1 until Upper Limit (9) displays ***OFF***.

8. If Lower Limit Function is desired, configure as follows:

   - With cursor on Lower Limit (10), press OFF/ON Soft Function Key F1 until Lower Limit (10) displays ***ON*** and Limit Value appears.
   - Enter Limit Value. Range is 0 to 100 kHz.
   - Set Lower Limit Function to OFF by pressing OFF/ON Soft Function Key F1 until Lower Limit (10) displays ***OFF***.

9. If Alarm Function is desired, configure as follows:

   - With cursor on Alarm (11), press OFF/ON Soft Function Key F1 until Alarm (11) displays ***ON***.

   - Set Alarm Function to OFF by pressing OFF/ON Soft Function Key F1 until Alarm (11) displays ***OFF***.

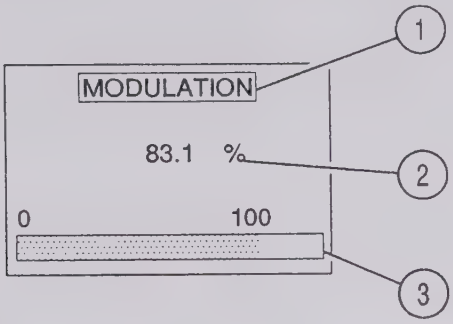
10. Refer to para 4-3-1(K) for information on configuring RF Receive Oscilloscope and para 4-3-1(L) for information on configuring RF Receive Spectrum Analyzer. If desired instrument is not shown, press ANALY/SCOPE Soft Function Key F2.

11. If displayed, press RETURN Soft Function Key F6 to return to RF Receive Operation Screen. Alternately, press REC MODE Key to return to RF Receive Operation Screen.

E. AM MODULATION METER

The AM Modulation Meter for the RF Receiver measures AM Modulation for an RF Signal. Filtering, for the signal passed to the AM Modulation Meter, is provided by the Audio/Data Filters. Refer to para 4-3-1(A) for information on configuring filters available.

Configure and operate the AM Modulation Meter as follows:



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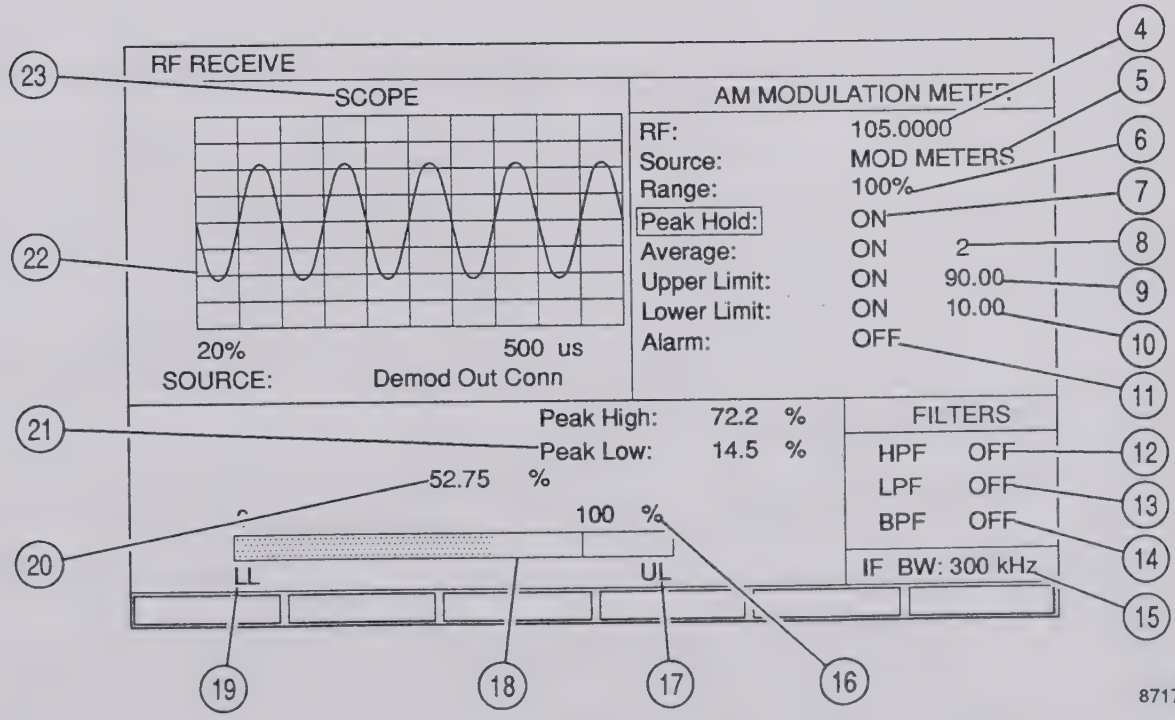


8717046

STEP	PROCEDURE

1. With cursor on SINAD/Distortion/Modulation Meter Label (1), press ZOOM Soft Key F1. Full Screen AM Modulation Meter is displayed.

2. Enter new frequency in RF Field (4) as needed.

3. Select Range (6). Selections include Autorange, 40% and 100%.

4. If Peak Hold Function is desired, configure as follows:

   - With cursor on Peak Hold (7), press OFF/ON Soft Function Key F1 until Peak Hold (7) displays ***ON***.
   - Peak Hold Function can be reset as desired by pressing RST PK Soft Function Key F5 where displayed.
   - Set Peak Hold Function to OFF by pressing OFF/ON Soft Function Key F1 until Peak Hold (7) displays ***OFF***.

5. If Average Function is desired, configure as follows:

   - With cursor on Average (8), press OFF/ON Soft Function Key F1 until Average (8) displays ***ON*** and Sample Number appears.
   - Enter Sample Number. Range is 2 to 10.
   - Set Average Function to OFF by pressing OFF/ON Soft Function Key F1 until Average (8) displays ***OFF***.

6. If Upper Limit Function is desired, configure as follows:

   - With cursor on Upper Limit (9), press OFF/ON Soft Function Key F1 until Upper Limit (9) displays ***ON*** and Limit Value appears.
   - Enter Limit Value. Range is 0% to 100%.
   - Set Upper Limit Function to OFF by pressing OFF/ON Soft Function Key F1 until Upper Limit (9) displays ***OFF***.

7. If Lower Limit Function is desired, configure as follows:

   - With cursor on Lower Limit (10), press OFF/ON Soft Function Key F1 until Lower Limit (10) displays ***ON*** and Limit Value appears.
   - Enter Limit Value. Range is 0% to 100%.
   - Set Lower Limit Function to OFF by pressing OFF/ON Soft Function Key F1 until Lower Limit (10) displays ***OFF***.

8. If Alarm Function is desired, configure as follows:

   - With cursor on Alarm (11), press OFF/ON Soft Function Key F1 until Alarm (11) displays ***ON***.

- Set Alarm Function to OFF by pressing OFF/ON Soft Function Key F1 until Alarm (11) displays ***OFF***.

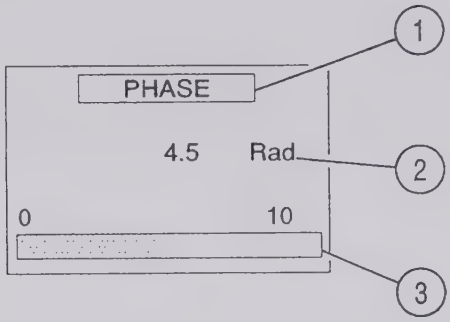
9. Refer to para 4-3-1(K) for information on configuring RF Receive Oscilloscope and para 4-3-1(L) for information on configuring RF Receive Spectrum Analyzer. If desired instrument is not shown, press ANALY/SCOPE Soft Function Key F2.

10. If displayed, press RETURN Soft Function Key F6 to return to RF Receive Operation Screen. Alternately, press REC MODE Key to return to RF Receive Operation Screen.

F. PHASE MODULATION METER

The Phase Modulation Meter for the RF Receiver measures Phase Deviation for an RF Signal. Filtering, for the signal passed to the Phase Modulation Meter, is provided by the Audio/Data Filters. Refer to para 4-3-1(A) for information on configuring filters available.

Configure and operate the Phase Modulation Meter as follows:



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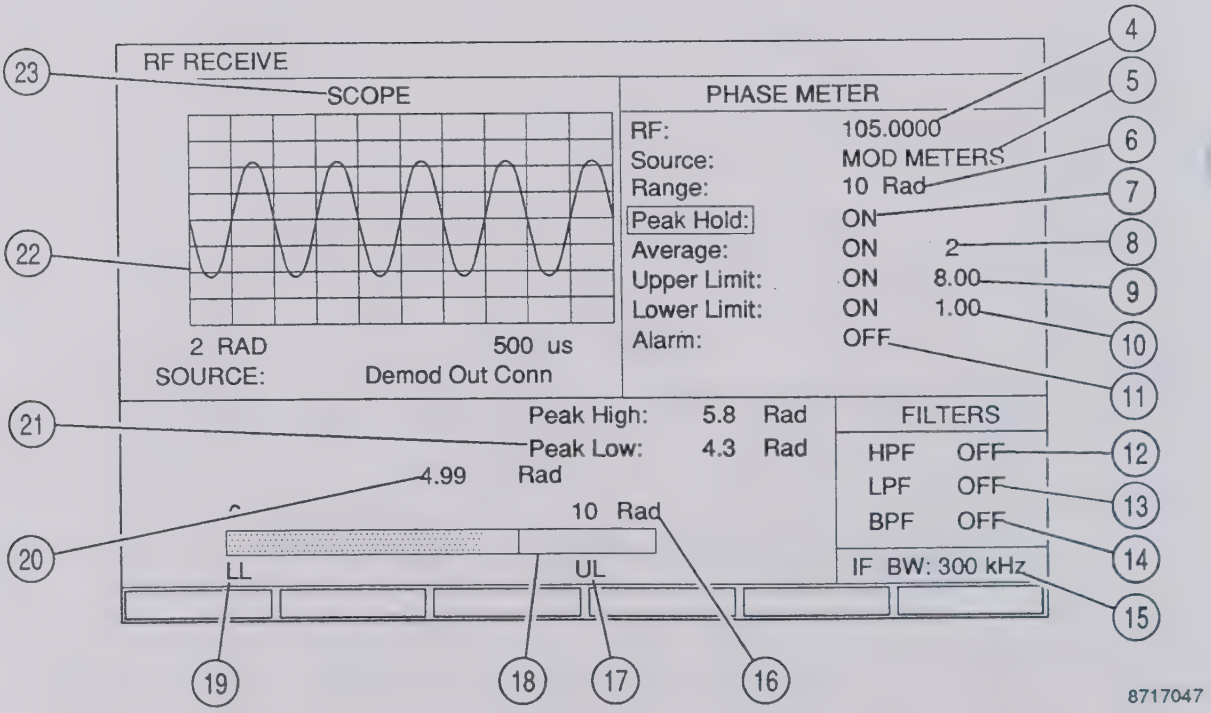


8717047

STEP	PROCEDURE

1. With cursor on SINAD/Distortion/Modulation Meter Label (1), press ZOOM Soft Key F1. Full Screen Phase Modulation Meter is displayed.

2. Enter new frequency in RF Field (4) as needed.

3. Select Range (6). Selections include Autorange, 1, 2, 5 and 10 Radians.

4. If Peak Hold Function is desired, configure as follows:

   - With cursor on Peak Hold (7), press OFF/ON Soft Function Key F1 until Peak Hold (7) displays ***ON***.
   - Peak Hold Function can be reset as desired by pressing RST PK Soft Function Key F2 where displayed.
   - Set Peak Hold Function to OFF by pressing OFF/ON Soft Function Key F1 until Peak Hold (7) displays ***OFF***.

5. If Average Function is desired, configure as follows:

   - With cursor on Average (8), press OFF/ON Soft Function Key F1 until Average (8) displays ***ON*** and Sample Number appears.
   - Enter Sample Number. Range is 2 to 10.
   - Set Average Function to OFF by pressing OFF/ON Soft Function Key F1 until Average (8) displays ***OFF***.

6. If Upper Limit Function is desired, configure as follows:

   - With cursor on Upper Limit (9), press OFF/ON Soft Function Key F1 until Upper Limit (9) displays ***ON*** and Limit Value appears.
   - Enter Limit Value. Range is 0 to 10 Radians.
   - Set Upper Limit Function to OFF by pressing OFF/ON Soft Function Key F1 until Upper Limit (9) displays ***OFF***.

7. If Lower Limit Function is desired, configure as follows:

   - With cursor on Lower Limit (10), press OFF/ON Soft Function Key F1 until Lower Limit (10) displays ***ON*** and Limit Value appears.
   - Enter Limit Value. Range is 0 to 10 Radians.
   - Set Lower Limit Function to OFF by pressing OFF/ON Soft Function Key F1 until Lower Limit (10) displays ***OFF***.

8. If Alarm Function is desired, configure as follows:

   - With cursor on Alarm (11), press OFF/ON Soft Function Key F1 until Alarm (10) displays ***ON***.

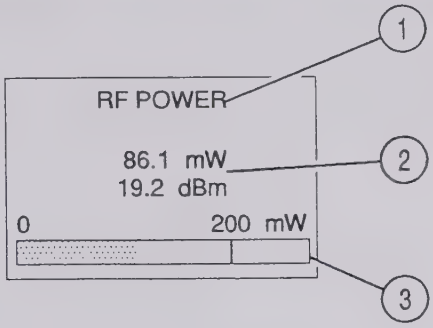
t Alarm Function to OFF by pressing OFF/ON Soft Function Key F1 until
arm (11) displays *OFF*.

to para 4-3-1(K) for information on configuring RF Receive Oscilloscope and
-3-1(L) for information on configuring RF Receive Spectrum Analyzer. If
d instrument is not shown, press ANALY/SCOPE Soft Function Key F2.

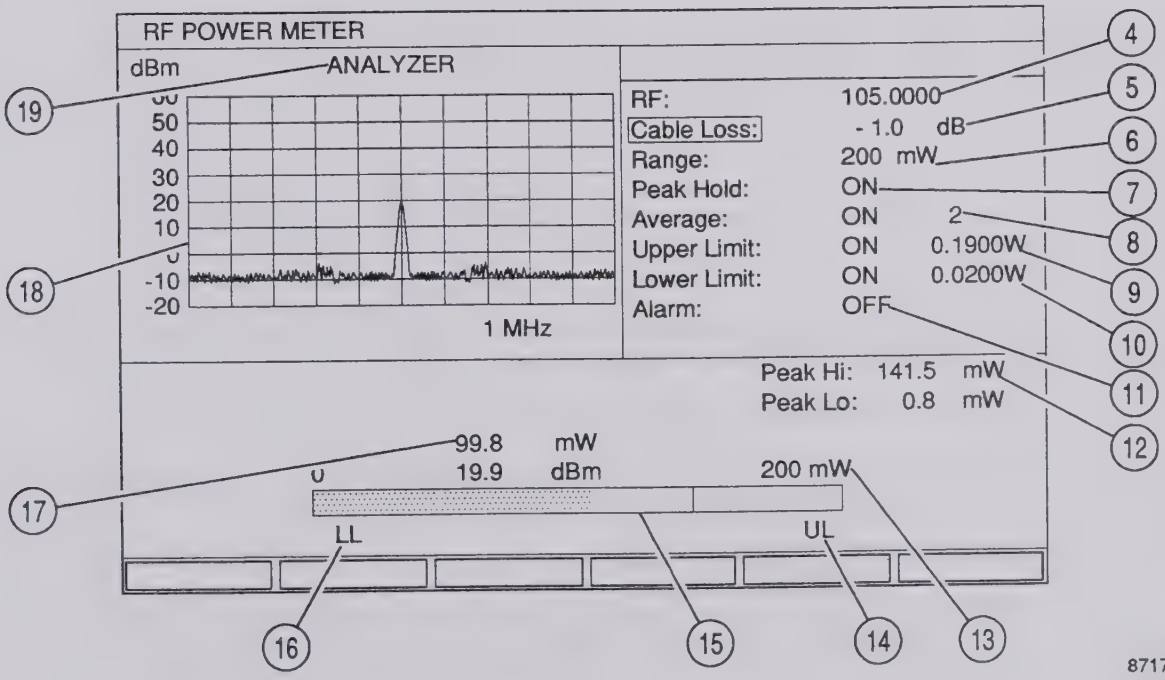
layed, press RETURN Soft Function Key F6 to return to RF Receive Operation
n. Alternately, press REC MODE Key to return to RF Receive Operation
n.

G. RF POWER METER

The RF Power Meter for the RF Receiver measures power of an RF Signal. Configure and operate the RF Power Meter as follows:



8717059



8717009

STEP PROCEDURE

1. With cursor on RF Power Meter/Received Level Meter Label (1), press ZOOM Soft Key F1. Full Screen RF Power Meter is displayed.

2. Enter new frequency in RF Field (4) as needed.

3. Enter Cable Loss (5) as needed.

4. Select Range (6). Selections include Autorange and the following:

2 mW	5 mW	10 mW
20 mW	50 mW	100 mW
200 mW	500 mW	1 W
2 W	5 W	10 W
20 W	50 W	100 W
200 W		

5. If Peak Hold Function is desired, configure as follows:

   - With cursor on Peak Hold (7), press OFF/ON Soft Function Key F1 until Peak Hold (7) displays ***ON***.
   - Peak Hold Function can be reset as desired by pressing RST PK Soft Function Key F5 where displayed.
   - Set Peak Hold Function to OFF by pressing OFF/ON Soft Function Key F1 until Peak Hold (7) displays ***OFF***.

6. If Average Function is desired, configure as follows:

   - With cursor on Average (8), press OFF/ON Soft Function Key F1 until Average (8) displays ***ON*** and Sample Number appears.
   - Enter Sample Number. Range is 2 to 10.
   - Set Average Function to OFF by pressing OFF/ON Soft Function Key F1 until Average (8) displays ***OFF***.

7. If Upper Limit Function is desired, configure as follows:

   - With cursor on Upper Limit (9), press OFF/ON Soft Function Key F1 until Upper Limit (9) displays ***ON*** and Limit Value appears.
   - Enter Limit Value. Range is 0 to 200 W.
   - Set Upper Limit Function to OFF by pressing OFF/ON Soft Function Key F1 until Upper Limit (9) displays ***OFF***.

8. If Lower Limit Function is desired, configure as follows:

   - With cursor on Lower Limit (10), press OFF/ON Soft Function Key F1 until Lower Limit (10) displays ***ON*** and Limit Value appears.
   - Enter Limit Value. Range is 0 to 200 W.

- Set Lower Limit Function to OFF by pressing OFF/ON Soft Function Key F1 until Lower Limit (10) displays ***OFF***.

9. If Alarm Function is desired, configure as follows:

   - With cursor on Alarm (11), press OFF/ON Soft Function Key F1 until Alarm (10) displays ***ON***.

   - Set Alarm Function to OFF by pressing OFF/ON Soft Function Key F1 until Alarm (11) displays ***OFF***.

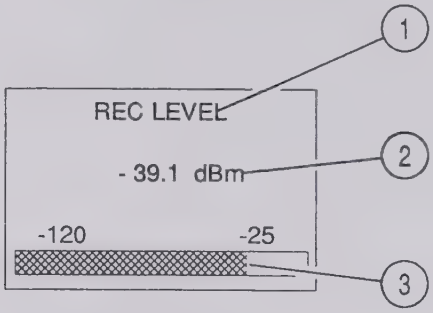
10. Refer to para 4-3-1(K) for information on configuring RF Receive Oscilloscope and para 4-3-1(L) for information on configuring RF Receive Spectrum Analyzer. If desired instrument is not shown, press ANALY/SCOPE Soft Function Key F2.

11. Once Meter is configured, press RE-ZERO Soft Function Key F3, with no signal present at T/R Connector.

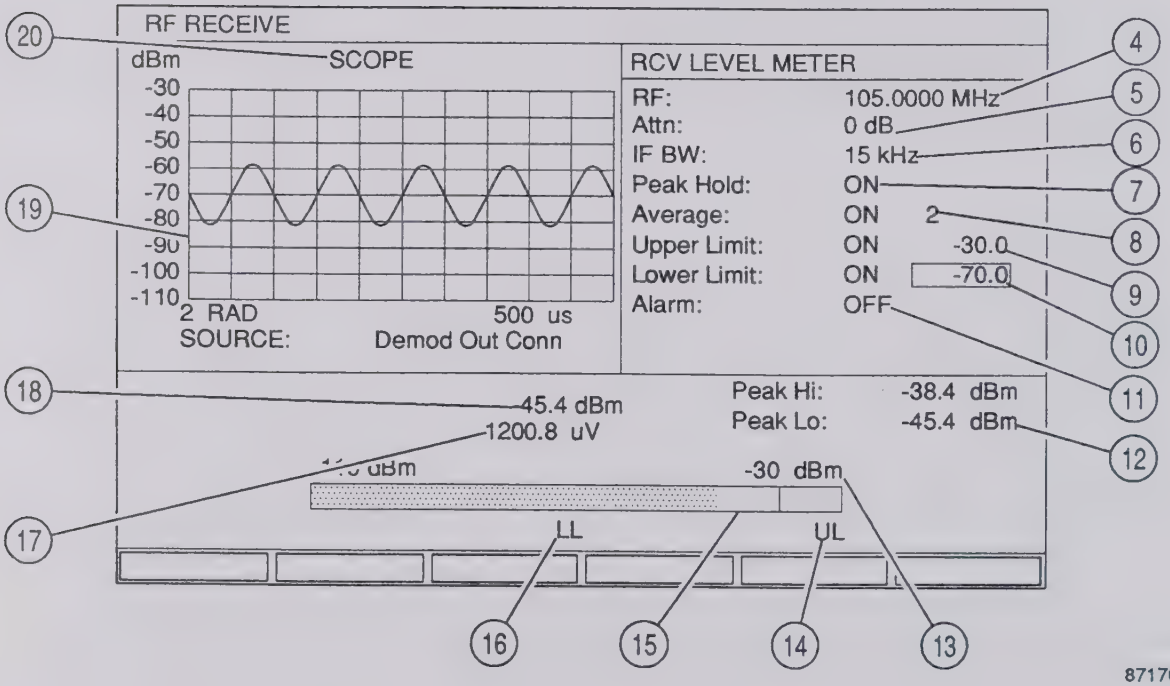
12. If displayed, press RETURN Soft Function Key F6 to return to RF Receive Operation Screen. Alternately, press REC MODE Key to return to RF Recieve Operation Screen.

H. RECEIVED LEVEL METER

The Received Level Meter for the RF Receiver measures referenced power of an RF Signal. Configure and operate the Received Level Meter as follows:



8717053



8717008

STEP	PROCEDURE

1. With cursor on RF Power Meter/Received Level Meter Label (1), press ZOOM Soft Key F1. Full Screen Received Level Meter is displayed.

2. Enter new frequency in RF Field (4) as needed.

3. Enter new Attenuation (5) as needed. Select as follows:

   - Press 30 dB Soft Function Key F1 to select 30 dB attenuation for Input Signal.
   - Press 0 dB Soft Function Key F2 to select no attenuation for Input Signal.

4. Enter new IF Bandwidth (6) as needed. Select as follows:

   - Press 300 kHz Soft Function Key F1 to select 300 kHz IF Bandwidth Filter.
   - Press 15 kHz Soft Function Key F2 to select 15 kHz IF Bandwidth Filter.

5. If Peak Hold Function is desired, configure as follows:

   - With cursor on Peak Hold (7), press OFF/ON Soft Function Key F1 until Peak Hold (7) displays ***ON***.
   - Peak Hold Function can be reset as desired by pressing RST PK Soft Function Key F5 where displayed.
   - Set Peak Hold Function to OFF by pressing OFF/ON Soft Function Key F1 until Peak Hold (7) displays ***OFF***.

6. If Average Function is desired, configure as follows:

   - With cursor on Average (8), press OFF/ON Soft Function Key F1 until Average (8) displays ***ON*** and Sample Number appears.
   - Enter Sample Number. Range is 2 to 10.
   - Set Average Function to OFF by pressing OFF/ON Soft Function Key F1 until Average (8) displays ***OFF***.

7. If Upper Limit Function is desired, configure as follows:

   - With cursor on Upper Limit (9), press OFF/ON Soft Function Key F1 until Upper Limit (9) displays ***ON*** and Limit Value appears.
   - Enter Limit Value. Range is -110 to -30 dBm.
   - Set Upper Limit Function to OFF by pressing OFF/ON Soft Function Key F1 until Upper Limit (9) displays ***OFF***.

8. If Lower Limit Function is desired, configure as follows:

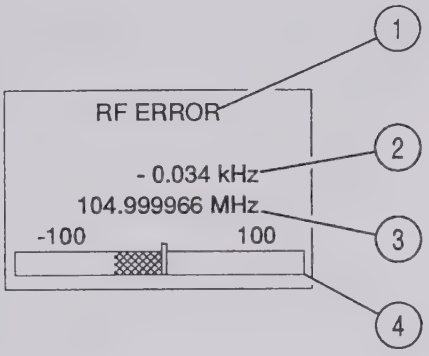
   - With cursor on Lower Limit (10), press OFF/ON Soft Function Key F1 until Lower Limit (10) displays ***ON*** and Limit Value appears.

- Enter Limit Value. Range is -110 to -30 dBm.
- Set Lower Limit Function to OFF by pressing OFF/ON Soft Function Key F1 until Lower Limit (10) displays ***OFF***.

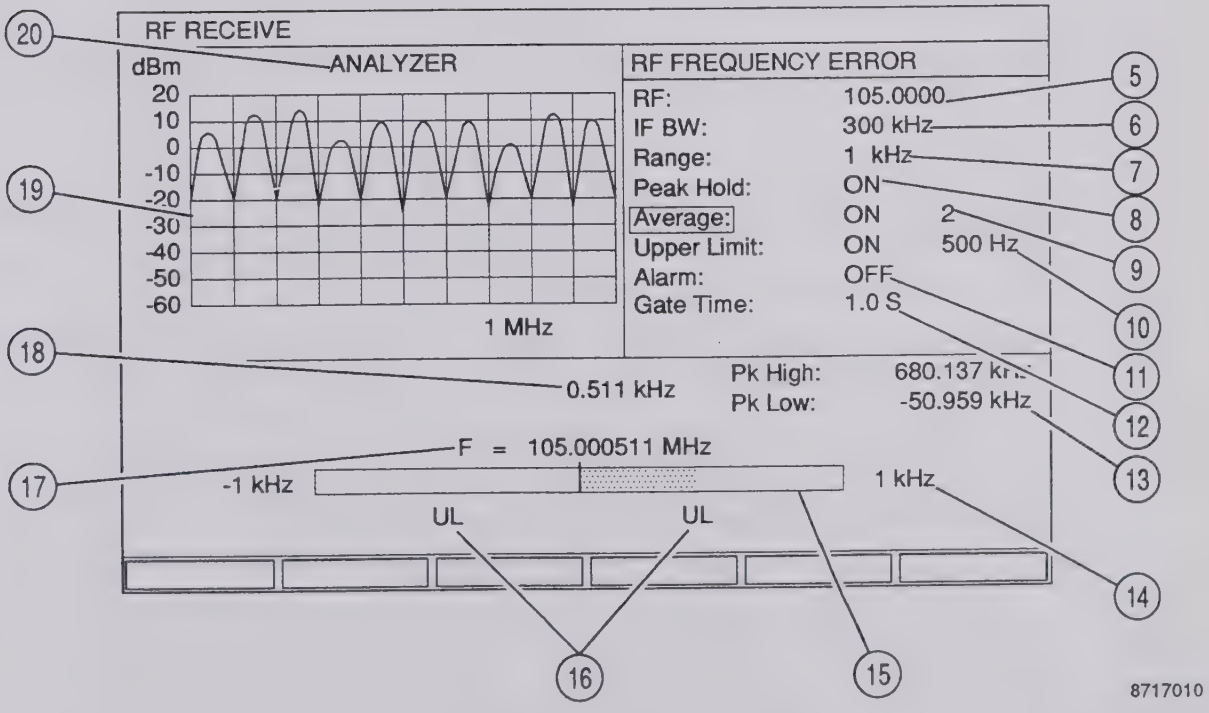
9. If Alarm Function is desired, configure as follows:
   - With cursor on Alarm (11), press OFF/ON Soft Function Key F1 until Alarm (10) displays ***ON***.
   - Set Alarm Function to OFF by pressing OFF/ON Soft Function Key F1 until Alarm (11) displays ***OFF***.
10. Refer to para 4-3-1(K) for information on configuring RF Receive Oscilloscope and para 4-3-1(L) for information on configuring RF Receive Spectrum Analyzer. If desired instrument is not shown, press ANALY/SCOPE Soft Function Key F2.
11. Once Meter is configured, Press SET LVL Soft Function Key F3 to set reference for meter. Connect coaxial cable between ANTENNA Connector and T/R Connector, when prompted. Press EXEC Soft Function Key F5 to set reference level. Press ESCAPE Soft Function Key F6 to exit without edit. SET LVL Function should be performed for each new frequency for greatest accuracy.
12. If displayed, press RETURN Soft Function Key F6 to return to RF Receive Operation Screen. Alternately, press REC MODE Key to return to RF Receive Operation Screen.

I. RF FREQUENCY ERROR METER

The RF Frequency Error Meter for the RF Receiver measures the frequency of the received RF Signal and reports the error. Configure and operate the RF Frequency Error Meter as follows:



8717054



8717010

STEP	PROCEDURE

1. With cursor on RF Frequency Error Meter Label (1), press ZOOM Soft Key F1. Full Screen RF Frequency Error Meter is displayed.

2. Enter new frequency in RF Field (5) as needed.

3. Enter new IF Bandwidth (6) as needed. Select as follows:

   - Press 300 kHz Soft Function Key F1 to select 300 kHz IF Bandwidth Filter.
   - Press 15 kHz Soft Function Key F2 to select 15 kHz IF Bandwidth Filter.

4. Set Range (7). Selections include Autorange, 100 Hz, 1, 10 and 100 kHz.

5. If Peak Hold Function is desired, configure as follows:

   - With cursor on Peak Hold (8), press OFF/ON Soft Function Key F1 until Peak Hold (8) displays ***ON***.
   - Peak Hold Function can be reset as desired by pressing RST PK Soft Function Key F2 where displayed.
   - Set Peak Hold Function to OFF by pressing OFF/ON Soft Function Key F1 until Peak Hold (8) displays ***OFF***.

6. If Average Function is desired, configure as follows:

   - With cursor on Average (9), press OFF/ON Soft Function Key F1 until Average (9) displays ***ON*** and Sample Number appears.
   - Enter Sample Number. Range is 2 to 10.
   - Set Average Function to OFF by pressing OFF/ON Soft Function Key F1 until Average (9) displays ***OFF***.

7. If Upper Limit Function is desired, configure as follows:

   - With cursor on Upper Limit (10), press OFF/ON Soft Function Key F1 until Upper Limit (10) displays ***ON*** and Limit Value appears.
   - Enter Limit Value. Range is -110 to -30 dBm.
   - Set Upper Limit Function to OFF by pressing OFF/ON Soft Function Key F1 until Upper Limit (10) displays ***OFF***.

8. If Alarm Function is desired, configure as follows:

   - With cursor on Alarm (11), press OFF/ON Soft Function Key F1 until Alarm (11) displays ***ON***.
   - Set Alarm Function to OFF by pressing OFF/ON Soft Function Key F1 until Alarm (11) displays ***OFF***.

9. Set Gate Time (12). Selections include Autorange, 0.1 Sec and 1.0 Sec.

STEP	PROCEDURE

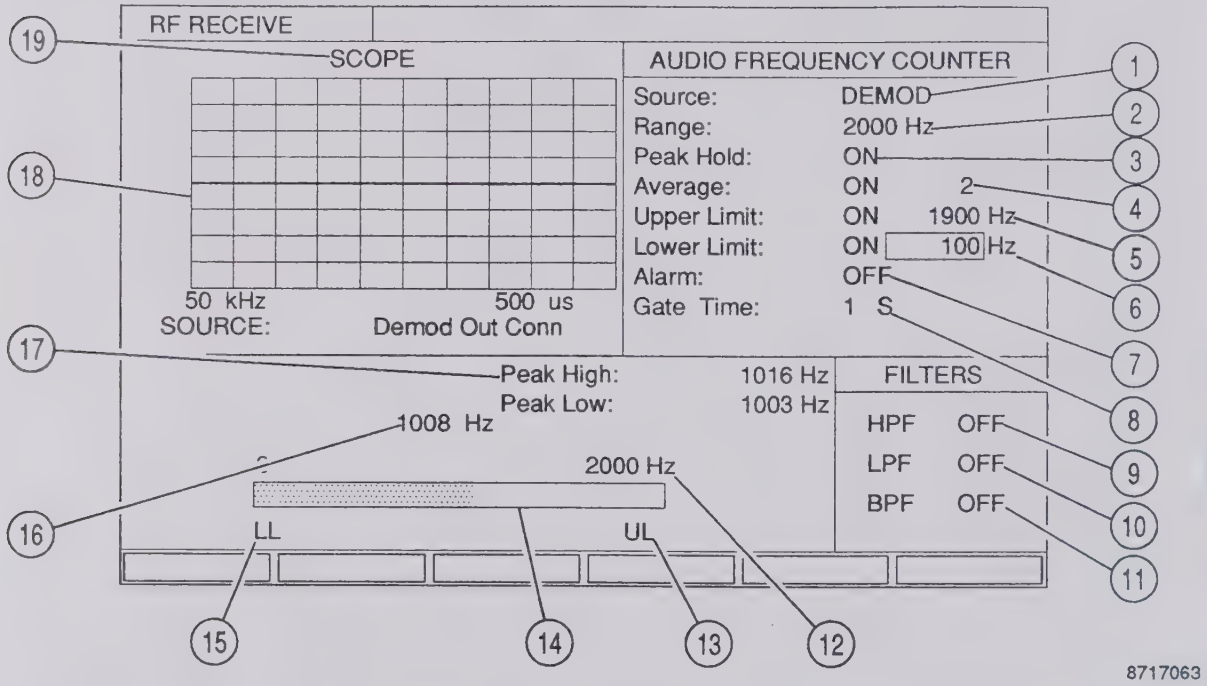
10. Refer to para 4-3-1(K) for information on configuring RF Receive Oscilloscope and para 4-3-1(L) for information on configuring RF Receive Spectrum Analyzer. If desired instrument is not shown, press ANALY/SCOPE Soft Function Key F2.

11. If displayed, press RETURN Soft Function Key F6 to return to RF Receive Operation Screen. Alternately, press REC MODE Key to return to RF Receive Operation Screen.

J. AUDIO FREQUENCY COUNTER

The Audio Frequency Counter for the RF Receiver counts the audio frequency that is modulating the received RF Signal. Filtering for the signal passed to the Audio Frequency Counter is provided by the Audio/Data Filters. Refer to para 4-3-1(A) for information on configuring filters available.

Access the Full Screen Audio Frequency Counter by pressing ZOOM Soft Function Key with the cursor on the Audio Frequency Counter Reading. Configure and operate the Full Screen Audio Frequency Counter as follows:



STEP	PROCEDURE

1. Set Range (2). Selections include Autorange, 200 Hz, 2 kHz and 20 kHz.
2. If Peak Hold Function is desired, configure as follows:
   - With cursor on Peak Hold (3), press OFF/ON Soft Function Key F1 until Peak Hold (3) displays ***ON***.
   - Peak Hold Function can be reset as desired by pressing RST PK Soft Function Key F5 where displayed.
   - Set Peak Hold Function to OFF by pressing OFF/ON Soft Function Key F1 until Peak Hold (3) displays ***OFF***.

3. If Average Function is desired, configure as follows:
   - With cursor on Average (4), press OFF/ON Soft Function Key F1 until Average (4) displays ***ON*** and Sample Number appears.
   - Enter Sample Number. Range is 2 to 10.
   - Set Average Function to OFF by pressing OFF/ON Soft Function Key F1 until Average (4) displays ***OFF***.
4. If Upper Limit Function is desired, configure as follows:
   - With cursor on Upper Limit (5), press OFF/ON Soft Function Key F1 until Upper Limit (5) displays ***ON*** and Limit Value appears.
   - Enter Limit Value. Range is 0 to 20000 Hz.
   - Set Upper Limit Function to OFF by pressing OFF/ON Soft Function Key F1 until Upper Limit (5) displays ***OFF***.
5. If Lower Limit Function is desired, configure as follows:
   - With cursor on Lower Limit (6), press OFF/ON Soft Function Key F1 until Lower Limit (6) displays ***ON*** and Limit Value appears.
   - Enter Limit Value. Range is 0 to 20000 Hz.
   - Set Lower Limit Function to OFF by pressing OFF/ON Soft Function Key F1 until Lower Limit (6) displays ***OFF***.
6. If Alarm Function is desired, configure as follows:
   - With cursor on Alarm (7), press OFF/ON Soft Function Key F1 until Alarm (10) displays ***ON***.
   - Set Alarm Function to OFF by pressing OFF/ON Soft Function Key F1 until Alarm (7) displays ***OFF***.
7. Set Gate Time (8). Selections include 1 and 10 seconds.
8. Refer to para 4-2-1(J) for information on configuring RF Receive Oscilloscope and para 4-2-1(K) for information on configuring RF Receive Spectrum Analyzer. If desired instrument is not shown, press ANALY/SCOPE Soft Function Key F2.
9. If displayed, press RETURN Soft Function Key F6 to return to RF Receive Operation Screen. Alternately, press REC MODE Key to return to RF Receive Operation Screen.

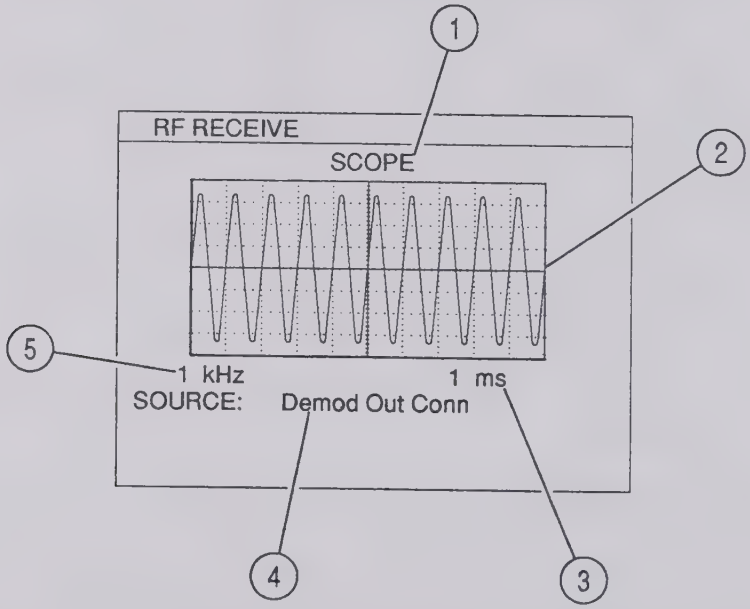
K. OSCILLOSCOPE OPERATION SCREEN

The RF Receive Oscilloscope is usable as an abbreviated Oscilloscope and as a Full Screen Oscilloscope. Configuring one is reflected in the other.

The abbreviated Oscilloscope, as shown below, is visible from the RF Receive Operation Screen and the following meters:

SINAD Meter Operation Screen (para 4-3-1[B])
Distortion Meter Operation Screen (para 4-3-1[C])
FM Deviation Meter Operation Screen (para 4-3-1[D])
AM Modulation Meter Operation Screen (para 4-3-1[E])
Phase Modulation Meter Operation Screen (para 4-3-1[F])
RF Power Meter Operation Screen (para 4-3-1[G])
Received Level Meter Operation Screen (para 4-3-1[H])
RF Frequency Error Meter Operation Screen (para 4-3-1[I])
Audio Frequency Counter Operation Screen (para 4-3-1[J])

Parameters set on any of the Operation Screens are reflected in all. Configuring the abbreviated Oscilloscope is as follows:



8717061

STEP	PROCEDURE

1. Select Sweep (3). Selections include:

100 µs/Div	200 µs/Div	500 µs/Div
1 ms/Div	2 ms/Div	5 ms/Div
10 ms/Div	20 ms/Div	50 ms/Div
100 ms/Div		

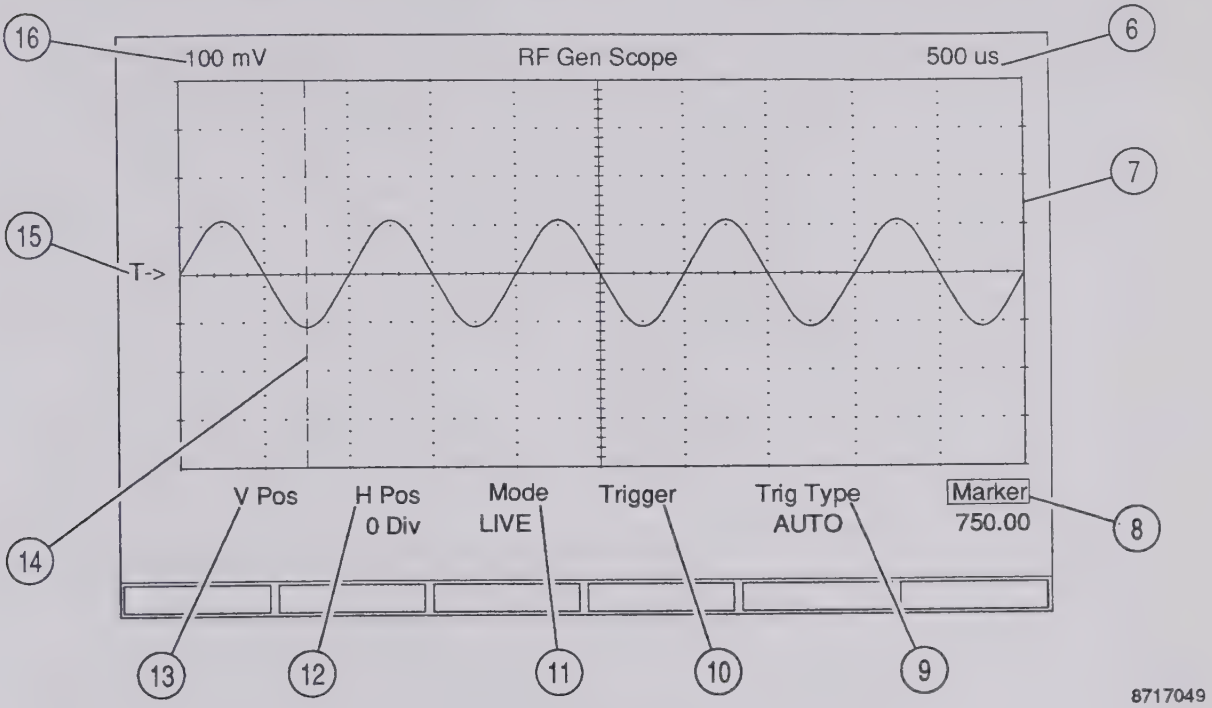
2. Select SCOPE SOURCE (4). Selections include:

SCOPE SOURCE (4)	Signal Input	Signal Type
Scope/DVM-GND	SCOPE/DVM Connector	External Ground-Coupled Signal
Scope/DVM-AC	SCOPE/DVM Connector	External AC-Coupled Signal
Scope/DVM-DC	SCOPE/DVM Connector	External DC-Coupled Signal
AF Cntr	Audio Frequency Counter Signal	Demodulated Signal passed through filters to Audio Frequency Counter.
Notch Residual	Internal Filtered Signal	Notch Filtered Signal passed to SINAD and Distortion Meters. Reading is relative with no units applied.
Audio/Data/Gen Out	AUDIO/DATA OUT Connector	Composite signal of Audio/Data Generators
AF Dec/SINAD	Signal applied to Audio Frequency Decoder, SINAD and Distortion Meters	Demodulated Signal passed through filters to Audio Frequency Decoder, SINAD and Distortion Meters
Data Decoder	Signal applied to Data Decoder	Demodulated Signal passed through filters to Data Decoder
RF Power	RF Power Meter Input	Relative to detected signal applied to RF Power Meter
Detector Out	Demodulated Audio	Unfiltered Demodulated Signal
Demod Out Connector	DEMOD Connector	Filtered Demodulated Signal applied to DEMOD Connector
Mod Meters	Modulation Meters source	Filtered Demodulated Signal applied to selected Modulation Meter.

3. Select Oscilloscope Scale. Selections include:

SCOPE SOURCE (4)	Available Scales
Scope/DVM-GND	10, 20, 50, 100, 200, 500 mV/Div 1, 2, 5, 10, 20, 50 V/Div
Scope/DVM-AC	10, 20, 50, 100, 200, 500 mV/Div 1, 2, 5, 10, 20, 50 V/Div
Scope/DVM-DC	10, 20, 50, 100, 200, 500 mV 1, 2, 5, 10, 20, 50 V
AF Cntr	0.02, 0.04, 0.10, 0.20, 0.40, 1.00
Notch Residual	0.02, 0.04, 0.10, 0.20, 0.40, 1.00
Audio/Data/Gen Out	20, 40, 100, 200, 400 mV 1 V
AF Dec/SINAD	FM DEMOD TYPE - 1, 2, 5, 10, 20, 50 kHz AM DEMOD TYPE - 20% PM DEMOD TYPE - 0.1, 0.2, 0.5, 1, 2, 5 Radians
Data Decoder	FM DEMOD TYPE - 1, 2, 5, 10, 20, 50 kHz AM DEMOD TYPE - 20% PM DEMOD TYPE - 0.1, 0.2, 0.5, 1, 2, 5 Radians
RF Power	Low, Med, High (Selection is automatic depending on power provided T/R Connector)
Detector Out	1, 2, 5, 10, 20, 50 kHz
Demod Out Connector	.02, .04, .1, .2, .4, 1.00
Mod Meters	FM DEMOD TYPE - 1, 2, 5, 10, 20, 50 kHz AM DEMOD TYPE - 20% PM DEMOD TYPE - 0.1, 0.2, 0.5, 1, 2, 5 Radians

Pressing ZOOM Soft Function Key F1 accesses full screen Oscilloscope, when cursor is on SCOPE/ANALYZER Prompt (1) of RF Receive Operation Screen and abbreviated Oscilloscope is displayed. Scope Source (4) must be selected before Full Screen Oscilloscope is accessed. Configuring the full screen Oscilloscope is as follows:



STEP PROCEDURE

1. Select Sweep (6). Selections include:

100 µs/Div	200 µs/Div	500µs/Div
1 ms/Div	2 ms/Div	5 ms/Div
10 ms/Div	20 ms/Div	50 ms/Div
100 ms/Div		

2. Select Trigger Type (9) as follows:

   - Press NORM Soft Function Key F1 to select Normalized Trigger.
   - Press AUTO Soft Function Key F2 to select Auto Trigger.
   - Press 1 SHOT Soft Function Key F3 to select One Shot Trigger. Press 1 SHOT Soft Function Key F3 as needed to reset Trigger.

3. Set Trigger (10) using DATA SCROLL Spinner or DATA SCROLL Keys. Trigger Level (15) displays level required to trigger Oscilloscope in 1 SHOT or NORM.

4. Select Operation Mode as follows:

   - Press LIVE Soft Function Key F2 to select Live Operation Mode.

- Press AVG Soft Function Key F3 to select Average Operation Mode.
- Press COMPARE Soft Function Key F4 to select Compare Operation Mode.
- Press RECALL Soft Function Key F5 to select Recall Operation Mode.
- Press STORE Soft Function Key F6 to select Store Operation Mode.

5. Select H POS (12) Offset as needed. Range is -10 to 10 Divisions.

6. Set Vertical Position of trace as needed by accessing V POS (13) and editing with DATA SCROLL Keys or DATA SCROLL Spinner.

7. Select Oscilloscope Scale (16). Selections available are dependent on Scope Source (4). Selections include:

SCOPE SOURCE (4)	Available Scales
Scope/DVM-GND	10, 20, 50, 100, 200, 500 mV/Div 1, 2, 5, 10, 20, 50 V/Div
Scope/DVM-AC	10, 20, 50, 100, 200, 500 mV/Div 1, 2, 5, 10, 20, 50 V/Div
Scope/DVM-DC	10, 20, 50, 100, 200, 500 mV 1, 2, 5, 10, 20, 50 V
AF Cntr	0.02, 0.04, 0.10, 0.20, 0.40, 1.00
Notch Residual	0.02, 0.04, 0.10, 0.20, 0.40, 1.00
Audio/Data/Gen Out	20, 40, 100, 200, 400 mV 1 V
AF Dec/SINAD	FM DEMOD TYPE - 1, 2, 5, 10, 20, 50 kHz AM DEMOD TYPE - 20% PM DEMOD TYPE - 0.1, 0.2, 0.5, 1, 2, 5 Radians
Data Decoder	FM DEMOD TYPE - 1, 2, 5, 10, 20, 50 kHz AM DEMOD TYPE - 20% PM DEMOD TYPE - 0.1, 0.2, 0.5, 1, 2, 5 Radians
RF Power	Low, Med, High (Selection is automatic depending on power provided T/R Connector)
Detector Out	1, 2, 5, 10, 20, 50 kHz
Demod Out Connector	.02, .04, .1, .2, .4, 1.00
Mod Meters	FM DEMOD TYPE - 1, 2, 5, 10, 20, 50 kHz AM DEMOD TYPE - 20% PM DEMOD TYPE - 0.1, 0.2, 0.5, 1, 2, 5 Radians

STEP	PROCEDURE

8. Activate Marker (14), as required, as follows:

   - With Cursor on Marker Position (8), press On/Off Soft Function Key F1.
   - Enter Desired Marker Position using DATA ENTRY Keys or DATA SCROLL Keys and/or DATA SCROLL Spinner.

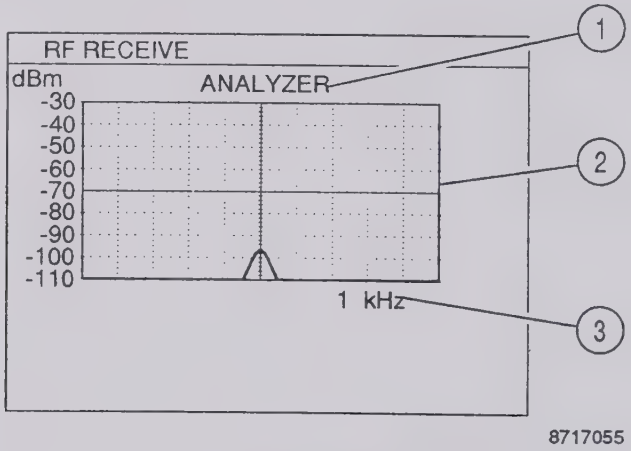
L. SPECTRUM ANALYZER OPERATION SCREEN

The RF Receive Spectrum Analyzer is usable as an abbreviated Spectrum Analyzer or as a Full Screen Spectrum Analyzer. Configuring one is reflected in the other.

The abbreviated Spectrum Analyzer, as shown below, is visible from the RF Receive Operation Screen and the following Meters:

SINAD Meter Operation Screen (para 4-3-1[B])
Distortion Meter Operation Screen (para 4-3-1[C])
FM Deviation Meter Operation Screen (para 4-3-1[D])
AM Modulation Meter Operation Screen (para 4-3-1[E])
Phase Modulation Meter Operation Screen (para 4-3-1[F])
RF Power Meter Operation Screen (para 4-3-1[G])
Received Level Meter Operation Screen (para 4-3-1[H])
RF Frequency Error Meter Operation Screen (para 4-3-1[I])
Audio Frequency Counter Operation Screen (para 4-3-1[J])

Parameters set on any of the above Operation Screens are reflected in all. Configuring the abbreviated Spectrum Analyzer is as follows:

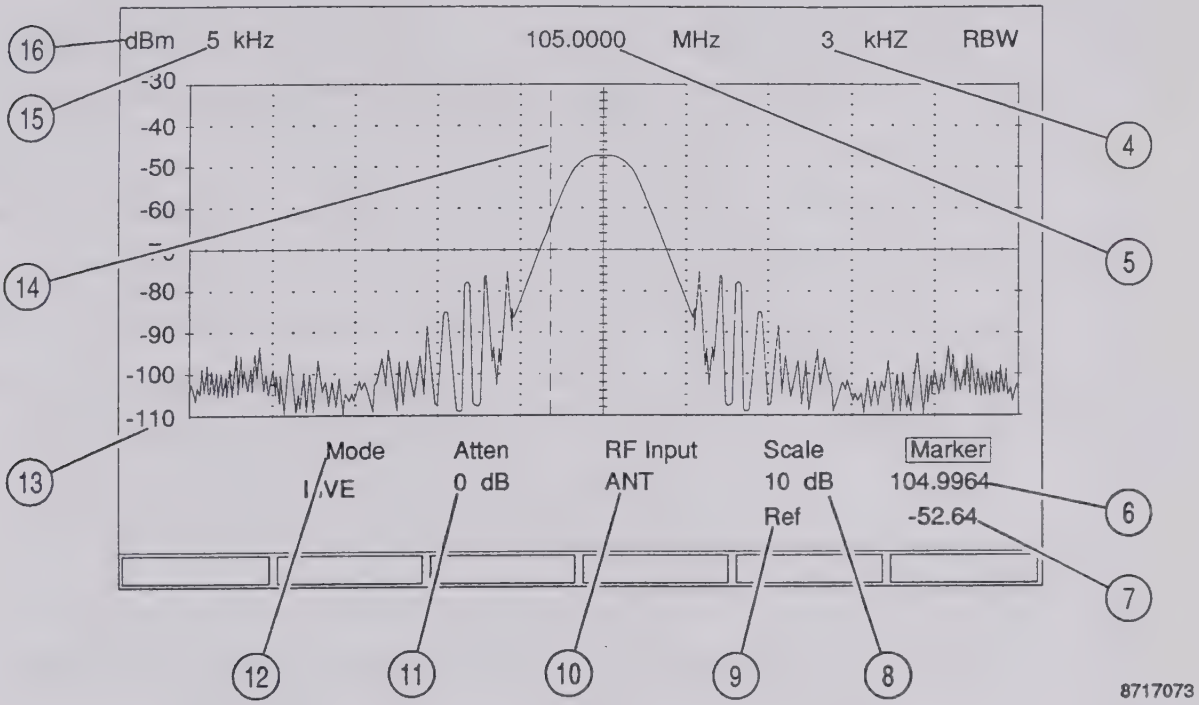


STEP	PROCEDURE

1. Select Scan Width (3). Selections include zero scan and:

1 kHz/Div	2 kHz/Div	5 kHz/Div
10 kHz/Div	20 kHz/Div	50 kHz/Div
100 kHz/Div	200 kHz/Div	500 kHz/Div
1 MHz/Div		

Pressing ZOOM Soft Function Key F1 accesses full screen Spectrum Analyzer, when cursor is on SCOPE/ANALYZER Prompt (1) of RF Receive Operation Screen and abbreviated Spectrum Analyzer is displayed. Available features and parameters are described below:



STEP PROCEDURE

1. Set Center Frequency (5). Press Set Ref Soft Function Key F1 if current Center Frequency is to used as Reference Frequency.

2. Select Scan Width (15). Selections include zero scan and:

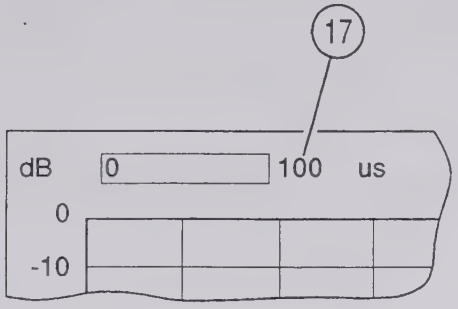
1 kHz/Div	2 kHz/Div	5 kHz/Div
10 kHz/Div	20 kHz/Div	50 kHz/Div
100 kHz/Div	200 kHz/Div	500 kHz/Div
1 MHz/Div		

3. Set Logarithmic Function (16) as follows:

   - Press dBm Soft Function Key F1 to select dBm.
   - Press dBµV Soft Function Key F2 to select dBµV.
   - Press dBmV Soft Function Key F3 to select dBmV.
   - Press dBV Soft Function Key F4 to select dBV.
   - Press dBµW Soft Function Key F5 to select dBµW.

- Press dBW Soft Function Key F6 to select dBW.

4. Set Scale (8) as follows:
   - Press 10 dB Soft Function Key F1 to select 10 dB for Vertical Scale (13).
   - Press 2 dB Soft Function Key F2 to select 2 dB for Vertical Scale (13).
5. Select Mode (12) as follows:
   - Press PKHOLD Soft Function Key F1 to select Peak Hold Operation Mode.
   - Press LIVE Soft Function Key F2 to select Live Operation Mode.
   - Press AVG Soft Function Key F3 to select Average Operation Mode.
   - Press COMPARE Soft Function Key F4 to select Compare Operation Mode.
   - Press RECALL Soft Function Key F5 to select Recall Operation Mode.
   - Press STORE Soft Function Key F6 to select Store Operation Mode.
6. Activate Marker (14), as required, as follows:
   - With Cursor on Marker Position (6), press On/Off Soft Function Key F1.
   - Enter Desired Marker Position using DATA ENTRY Keys or DATA SCROLL Keys and/or DATA SCROLL Spinner.
7. Access Ref (9) Field to adjust Vertical Scale (13), as needed.
8. Select RF Input (10) as needed.
   - Press T/R Soft Function Key F1 to select T/R Connector.
   - Press ANT Soft Function Key F2 to select ANTENNA Connector.
9. Select Attenuation (11) as needed.
   - Press 30 dB Soft Function Key F1 to select 30 dB Attenuation.
   - Press 0 dB Soft Function Key F2 to select 0 dB Attenuation.



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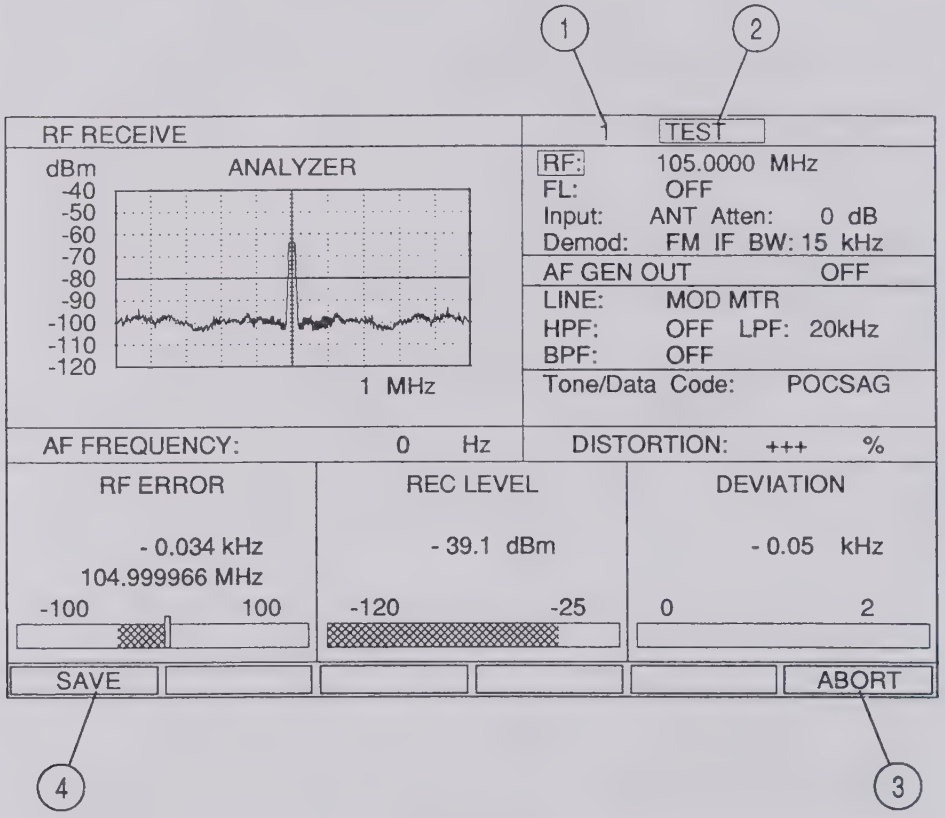
10. If Scan Width (15) is set to zero scan, enter Zero Scan Sweep (17). Selections include:

100 µs/Div	200 µs/Div	500 µs/Div
1 ms/Div	2 ms/Div	5 ms/Div
10 ms/Div	20 ms/Div	50 ms/Div
100 ms/Div		

M. STORE AND RECALL OPERATION

Pressing STORE Memory Key allows the operator to store up to 100 RF Receive Operation Screen configurations. Storage Locations 0 through 49 can be used to store a RF Generate Operation configuration, a RF Receive Operation configuration or a Duplex Operation configuration (Receive and Generate pair). Refer to para 3-3-8(B) for information on the Setup List that displays all Memory Locations, operation types and associated Memory Location Label (2).

STORE Operation for the RF Receive Operation is as follows:



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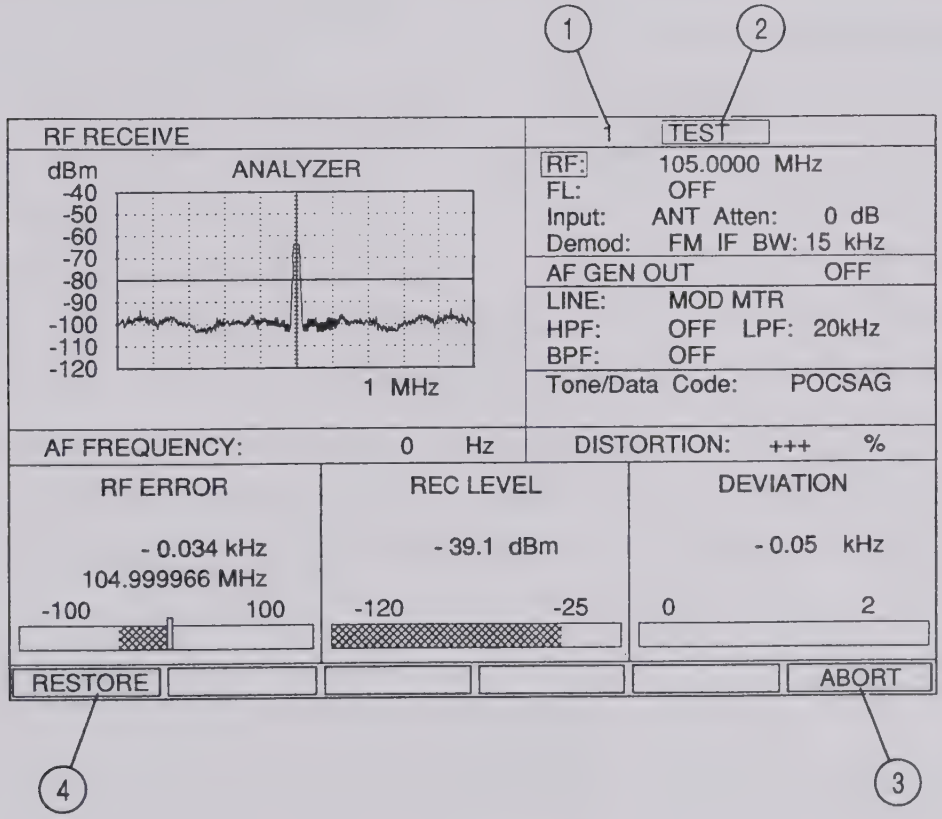
STEP	PROCEDURE

1. Press STORE MEMORY Key.
2. Enter Memory Location (1) value. Range is 0 to 49. Press ENTER Key.
3. If Memory Location Label (2) is desired, press ENTER Key, with Cursor on Memory Location Label (2) field. Enter Label using DATA ENTRY Keys. Label can be alphabetic and/or numeric characters. Press ENTER Key.
4. Press SAVE Soft Function Key F1 (4) to accept selections and save Setup. Press ABORT Soft Function Key F6 (3) to escape without saving Setup.

Pressing RCL Memory Key allows the operator to recall up to 50 previously stored operation screens. RF Receive, RF Generate or Duplex Operation Screen configurations can all be accessed from the RF Generate Operation Screen. Accessing anything other than an RF Generate Operation Screen configuration, automatically switches the COM-120A to the selected mode of operation. Refer to para 3-3-8(B) for information on the Setup List that displays all Memory Locations, operation types and associated Memory Location Labels (2).

RECALL Operation for the RF Receive Operation is as follows:



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STEP	PROCEDURE

1. Press RECALL MEMORY Key.
2. Enter Memory Location (1) value. Range is 0 to 49. Press ENTER Key.
3. Press RESTORE Soft Function Key F1 (4) to accept selections and recall Setup. Press ABORT Soft Function Key F6 (3) to escape without recalling Setup.

4-3-2 RECEIVING FM MODULATED RF SIGNAL

The following procedure configures the RF Receive Operation Screen to receive a 100 MHz Frequency Modulated RF Signal at the ANTENNA Connector. The transmitted signal has 5 kHz deviation of a 1 kHz sine wave at -60 dBm level. The speaker is configured to play the demodulated signal.

STEP	PROCEDURE

1. Set RF Field to ***100 MHz***.
2. Set Input Connector to ***ANT***.
3. Set Attenuation to ***0 dB***.
4. Set Demodulation Type to ***FM***.
5. Set IF Bandwidth to ***300 kHz***.
6. Access Filters Setup Menu.
7. Set Mod Meter Filter Line Low-Pass Filter to ***20 kHz***.
8. Set AF Counter Filter Line Low-Pass Filter to ***4 kHz***.
9. Set Speaker/Headphones Filter Line to ***W.B.*** (Wideband).
10. Return to RF Receive Operation Screen.
11. Adjust VOLUME Control for desired audio level.

4-3-3 RECEIVING AM MODULATED RF SIGNAL

The following procedure configures the RF Receive Operation Screen to receive a 100 MHz Amplitude Modulated RF Signal at the ANTENNA Connector. The transmitted signal has 40% Modulation Rate of a 1 kHz sine wave at -60 dBm level. The speaker is configured to play the demodulated signal.

STEP	PROCEDURE

1. Set RF Field to ***100 MHz***.
2. Set Input Connector to ***ANT***.
3. Set Attenuation to ***0 dB***.
4. Set Demodulation Type to ***AM***.
5. Set IF Bandwidth to ***300 kHz***.
6. Access Filters Setup Menu.
7. Set Mod Meter Filter Line Low-Pass Filter to ***20 kHz***.
8. Set AF Counter Filter Line Low-Pass Filter to ***4 kHz***.
9. Set Speaker/Headphones Filter Line to ***W.B.*** (Wideband).
10. Return to RF Receive Operation Screen.
11. Adjust VOLUME Control for desired audio level.

4-3-4 RECEIVING PM MODULATED RF SIGNAL

The following procedure configures the RF Receive Operation Screen to receive a 100 MHz Phase Modulated RF Signal at the ANTENNA Connector. The transmitted signal has 5 Radians deviation of a 1 kHz sine wave at -60 dBm level. The speaker is configured to play the demodulated signal.

STEP	PROCEDURE

1. Set RF Field to ***100 MHz***.
2. Set Input Connector to ***ANT***.
3. Set Attenuation to ***0 dB***.
4. Set Demodulation Type to ***PM***.
5. Set IF Bandwidth to ***300 kHz***.
6. Access Filters Setup Menu.
7. Set Mod Meter Filter Line Low-Pass Filter to ***20 kHz***.
8. Set AF Counter Filter Line Low-Pass Filter to ***4 kHz***.
9. Set Speaker/Headphones Filter Line to ***W.B.*** (Wideband).
10. Return to RF Receive Operation Screen.
11. Adjust VOLUME Control for desired audio level.

4-3-5 RECEIVING DCS CODED RF SIGNAL

The following procedure configures the RF Receive Operation Screen to receive a 100 MHz RF Signal FM Modulated with a DCS Code at the ANTENNA Connector. The deviation is 5 kHz.

STEP	PROCEDURE

1. Set RF Field to ***100 MHz***.
2. Set Input Connector to ***ANT***.
3. Set Attenuation to ***0 dB***.
4. Set Demodulation Type to ***FM***.
5. Set IF Bandwidth to ***300 kHz***.
6. Access Filters Setup Menu.
7. Set Mod Meter Filter Line Low-Pass Filter to ***20 kHz***.
8. Set AF Counter Filter Line Low-Pass Filter to ***4 kHz***.
9. Set Speaker/Headphones Filter Line to ***W.B.*** (Wideband).
10. Return to RF Receive Operation Screen.
11. Tone/Data Code Field to ***DCS***.

Screen to receive a 100 MHz RF
:ctor. The deviation is set for

.nd).

4-3-7 MEASURING TRANSMITTER FM DEVIATION

The following Procedure configures the RF Receive Operation Screen to measure the FM Deviation of an RF Signal. The signal being measured is a 100 MHz FM Modulated signal with a 12 kHz tone and 50 kHz deviation. Signal is applied at the ANTENNA Connector.

STEP	PROCEDURE

1. Set RF Field to ***100 MHz***.
2. Set Input Connector to ***ANT***.
3. Set Attenuation to ***0 dB***.
4. Set Demodulation Type to ***FM***.
5. Set IF Bandwidth to ***300 kHz***.
6. Access Filters Setup Menu.
7. Set Mod Meter Filter Line Low-Pass Filter to ***OFF***.
8. Configure RF Receive Operation Screen to display FM Deviation Meter. Access Full Screen FM FM DeviationDeviation Meter.
9. Set Range to ±100 kHz.
10. Set Peak Hold, Average, Upper Limit, Lower Limit and Alarm as required.
11. Return to RF Receive Operation Screen.
12. Apply signal to ANTENNA Connector.

4-3-8 MEASURING TRANSMITTER AM MODULATION

The following Procedure configures the RF Receive Operation Screen to measure the AM Modulation of an RF Signal. The signal being measured is a 100 MHz AM Modulated signal with a 12 kHz tone and 30% Modulation. Signal is applied at the ANTENNA Connector.

STEP	PROCEDURE

1. Set RF Field to ***100 MHz***.
2. Set Input Connector to ***ANT***.
3. Set Attenuation to ***0 dB***.
4. Set Demodulation Type to ***AM***.
5. Set IF Bandwidth to ***300 kHz***.
6. Access Filters Setup Menu.
7. Set Mod Meter Filters to ***OFF***.
8. Configure RF Receive Operation Screen to display AM Modulation Meter. Access Full Screen AM Modulation Meter.
9. Set Range to ***40%***.
10. Set Peak Hold, Average, Upper Limit, Lower Limit and Alarm as required.
11. Return to RF Receive Operation Screen.
12. Apply signal to ANTENNA Connector.

4-3-9 MEASURING TRANSMITTER PHASE MODULATION

The following Procedure configures the RF Receive Operation Screen to measure the Phase Modulation of an RF Signal. The signal being measured is a 100 MHz PM Modulated signal with a 12 kHz tone and 5.0 Radians deviation. Signal is applied at the ANTENNA Connector.

STEP	PROCEDURE

1. Set RF Field to ***100 MHz***.
2. Set Input Connector to ***ANT***.
3. Set Attenuation to ***0 dB***.
4. Set Demodulation Type to ***PM***.
5. Set IF Bandwidth to ***300 kHz***.
6. Access Filters Setup Menu.
7. Set Mod Meter Filter Line Low-Pass Filter to ***OFF***.
8. Configure RF Receive Operation Screen to display Phase Modulation Meter. Access Full Screen Phase Modulation Meter.
9. Set Range to ***10 RAD***.
10. Set Peak Hold, Average, Upper Limit, Lower Limit and Alarm as required.
11. Return to RF Receive Operation Screen.
12. Apply signal to ANTENNA Connector.

4-3-10 MEASURING TRANSMITTER POWER

The following procedure configures the RF Receive Operation Screen to measure the power of a 100 MHz RF Signal at the T/R Connector.

STEP	PROCEDURE

1. Set RF Field to ***100 MHz***.
2. Set Input to ***T/R***.
3. Set Attenuation to ***0 dB***.
4. Set IF Bandwidth to ***300 kHz***.
5. Access Full Screen RF Power Meter.
6. Enter selected Cable Loss.
7. Set Range to ***AUTO***.
8. Set Peak Hold, Average, Upper Limit, Lower Limit and Alarm as required.
9. Return to RF Receive Operation Screen.
10. Apply signal to ANTENNA Connector.

4-3-11 MEASURING TRANSMITTER FREQUENCY ERROR

The following procedure configures the RF Receive Operation Screen to measure the Frequency Error of a 100 MHz RF Signal at the ANTENNA Connector.

STEP	PROCEDURE

1. Set RF Field to ***100 MHz***.
2. Set Input to ***ANT***.
3. Set Attenuation to ***0 dB***.
4. Set IF Bandwidth to ***300 kHz***.
5. Access Full Screen RF Frequency Error Meter.
6. Set Range to ***AUTO***.
7. Set Peak Hold, Average, Upper Limit, Lower Limit and Alarm as required.
8. Set Gate Time to ***1.0 S***.
9. Return to RF Receive Operation Screen.
10. Apply signal to ANTENNA Connector.

4-3-12 MEASURING TRANSMITTER AUDIO FREQUENCY

The following procedure configures the RF Receive Operation Screen to measure the Audio Frequency of a 100 MHz RF Signal at the ANTENNA Connector.

STEP	PROCEDURE

1. Set RF Field to ***100 MHz***.
2. Set Input to ***ANT***.
3. Set Attenuation to ***0 dB***.
4. Set IF Bandwidth to ***300 kHz***.
5. Set AF COUNTER Filter Lines as required.
6. Access Full Screen Audio Frequency Counter.
7. Set Range to ***AUTO***.
8. Set Peak Hold, Average, Upper Limit, Lower Limit and Alarm as required.
9. Set Gate Time to ***10 S***.
10. Return to RF Receive Operation Screen.
11. Apply signal to ANTENNA Connector.

4-3-13 MEASURING TRANSMITTER SINAD

The following procedure configures the RF Receive Operation Screen to measure the SINAD of a 100 MHz RF Signal at the ANTENNA Connector. The signal is FM Modulated and has 1 kHz sine wave as audio.

STEP	PROCEDURE

1. Set RF Field to ***100 MHz***.
2. Set Input to ***ANT***.
3. Set Attenuation to ***0 dB***.
4. Set Demodulation Type to ***FM***.
5. Set IF Bandwidth to ***300 kHz***.
6. Set AF DECODE/SINAD Low Pass Filter Line to 4 kHz.
7. Set AF DECODE/SINAD High Pass Filter Line to 300 Hz.
8. Access Full Screen SINAD Meter.
9. Set Range to ***30 dB***.
10. Set Peak Hold, Average, Upper Limit, Lower Limit and Alarm as required.
11. Return to RF Receive Operation Screen.
12. Apply signal to ANTENNA Connector.

4-3-14 MEASURING TRANSMITTER DISTORTION

The following procedure configures the RF Receive Operation Screen to measure the Distortion of a 100 MHz RF Signal at the ANTENNA Connector. The signal is FM Modulated and has a 1 kHz sine wave as audio.

STEP	PROCEDURE

1. Set RF Field to ***100 MHz***.
2. Set Input to ***ANT***.
3. Set Attenuation to ***0 dB***.
4. Set Demodulation Type to ***FM***.
5. Set IF Bandwidth to ***300 kHz***.
6. Set AF DECODE/SINAD Low Pass Filter Line to 4 kHz.
7. Set AF DECODE/SINAD High Pass Filter Line to 300 Hz.
8. Access Full Screen Distortion Meter.
9. Set Peak Hold, Average, Upper Limit, Lower Limit and Alarm as required.
10. Return to RF Receive Operation Screen.
11. Apply signal to ANTENNA Connector.

4-4 DUPLEX OPERATION

Pressing the DPLX MODE Key accesses the Duplex Operation Screen. The purpose of the Duplex Mode is for the COM-120A to act as a transmitter and receiver and test a transceiver that may or may not have a frequency offset.

Configuring the Duplex Operation Screen is covered in a very generic sense in this section. This section is provided to explain how each of the active fields are edited and what selections are available. It is not designed to perform a specific test, but instead is provided as a reference for operating the Duplex Operation Screen. To fully understand this section, the operator must read and understand para 3-3-1 and para 4-1.

For Configuring the Duplex Generate Operation, refer to para 4-2. For configuring the Duplex Receive Operation Screen, refer to para 4-3. The Duplex Receive and Duplex Generate Operation Screens are similar in configuration and operation to the RF Receive and RF Generate Screens. Additionally specific test and configurations discussed in those two sections are applicable with the Duplex System.

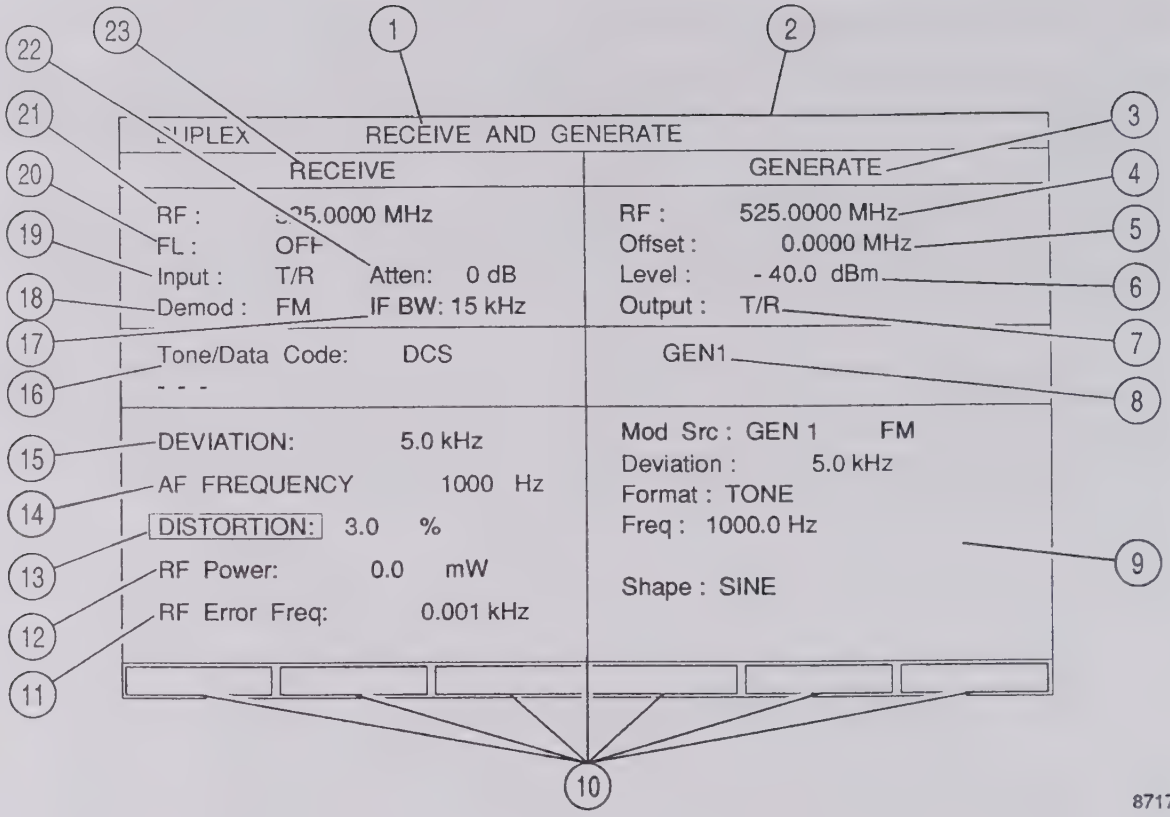


Figure 4-3 Duplex Operation Screen

STEP	PROCEDURE

1. Enter desired frequency in Duplex Generate RF Field (4). Frequency range is .2500 to 1000 MHz. Activate additional functions as required as follows:

   - To operate with Δ Function active:

     - Press Δ On/Off Soft Function Key F2 until Δ prompt appears beside Duplex Generate RF Field(4).

     - Δ= increment is accessed by pressing Δ = Soft Function Key F1 activating window to set Duplex Generate RF Field (4) change increment. Range of increment is 0 to 500 MHz. Press RETURN Soft Function Key F6 to close Change Window.

     - To deactivate Δ Function, press Δ On/Off Soft Function Key F2 until Δ prompt no longer appears beside RF Field

- To Operate with Set Reference Function, press SET REF Soft Function Key F3 until ***R*** appears beside Duplex Generate RF Field (4). When active, Duplex Generate RF Field (4) is set to 0 MHz and changes made to Duplex Generate RF Field (4) display offset from Reference Frequency. To deactivate Set Reference Function, press SET REF Soft Function Key until ***R*** is not visible.

- To activate Pair Function, press PAIR Soft Function Key F5. To deactivate Pair Function, press UNPAIR Soft Function Key F5.

2. Set Frequency Offset (5) to desired value. Selections range from -999.750 to 999.750 MHz. To activate Pair Function, press PAIR Soft Function Key F1. To deactivate Pair Function, press UNPAIR Soft Function Key F2.

3. Set Output Level (6) as follows:

   - Select Output Level Units as follows:

     - Pressing dBm Soft Function Key F1 selects dBm as Output Level Units.

     - Pressing uV Soft Function Key F2 selects µV as Output Level Units.

     - Pressing mV Soft Function Key F3 selects mV as Output Level Units.

     - Pressing V Soft Function Key F4 selects V as Output Level Units.

     - Pressing uV Soft Function Key F2 selects µV as Output Level Units.

   - Once Output Level Units are selected, select Output Level.

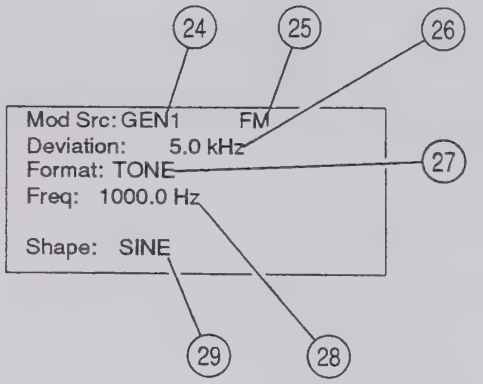
4. Select Output (7) as follows:

   - Press T/R Soft Function Key F1 to select T/R Connector as output connector.

   - Press AUX Soft Function Key F2 to select AUX RF Connector as output connector.

   - Press T/R Gate Soft Function Key F3 to select T/R Connector as output connector. Output is only active when microphone is keyed while attached to MIC/ACC Connector.

   - Press AUX Gate Soft Function Key F4 to select AUX RF Connector as gated output connector. Output is only active when microphone is keyed while attached to MIC/ACC Connector.



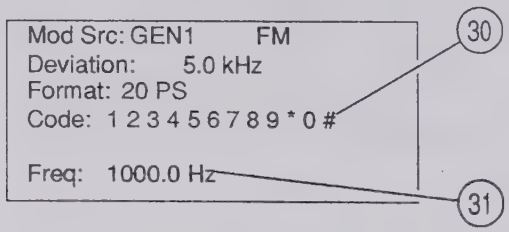
5. Set Modulation Source Block (9) as follows:

   - If Audio Generator 1 (GEN1) Operation is desired, perform Step 6.
   - If Audio Generator 2 (GEN2) Operation is desired, perform Step 7.
   - If DATA Generator (DATA) Operation is desired, perform Step 8.
   - If DTMF Generator (DTMF) Operation is desired, perform Step 9.
   - If External Modulation (EXT) Operation is desired, perform Step 10.
   - If Microphone Modulation (MIC) Operation is desired, perform Step 11.

6. If Audio Generator 1 (GEN1) Operation is desired, set Modulation Source Block (5) as follows:

   - Press GEN1 Soft Function Key F1 to select GEN1 for Modulation Source (24).
   - Select Modulation Type (25) as follows:
     - Press OFF Soft Function Key F1 to deactivate GEN1.
     - Press AM Soft Function Key F2 if AM Modulation is desired.
     - Press FM Soft Function Key F3 if FM Modulation is desired.
     - Press PM Soft Function Key F4 if PM Modulation is desired.
   - Enter Deviation/Modulation Level (26). Range is 0.0 to 100 kHz for FM Modulation, 0% to 100% for AM Modulation, 0 to 10 Radians for PM Modulation.

- Select Format (27). Formats available include USER and TONE.
- With cursor on Format (27), select transmission type:
  - Press CONT Soft Function Key F2 to select continuous transmission of signal.
  - Press BURST Soft Function Key F3 if single transmission of selected signal.
  - If TONE is selected as Format (27), press TIME Soft Function Key F4 to access Burst TIme WIndow. Enter Burst Time. Press RETURN Soft Function Key F6 to exit Window.
  - IF USER is selected as Format (27), Press CONFIG Soft Function Key F4 to access Configuration Window for configuring User Selectable Frequency and Duration for codes 0 through 9 and A through T. Enter desired frequencies and durations for codes. Range of frequencies are 0 to 9999.9 Hz. Range of durations are 0 to 99.999 seconds. Use PG UP Soft Function Key F1 to scroll up through Configuration Window. Use PG DN to scroll down through Configuration Window. Use FILL Soft Function Key F3 to fill remainder of current column with value of current cursor position. Press RETURN Soft Function Key F6 to exit Window.
- If TONE is selected as Format (27)
  - Enter Audio Tone Frequency (28). Range is 0 to 20000 Hz for SINE Shape (29) and 0 to 10000 Hz for other Shape (29) settings.
  - Select Shape (29) of Wave as follows:
    - Press SINE Soft Function Key F1 to select SINE Wave Shape.
    - Press RAMP Soft Function Key F2 to select RAMP Wave Shape.
    - Press TRIANGLE Soft Function Key F3 to select TRIANGLE Wave Shape.
    - Press SQUARE Soft Function Key F4 to select SQUARE Wave Shape.



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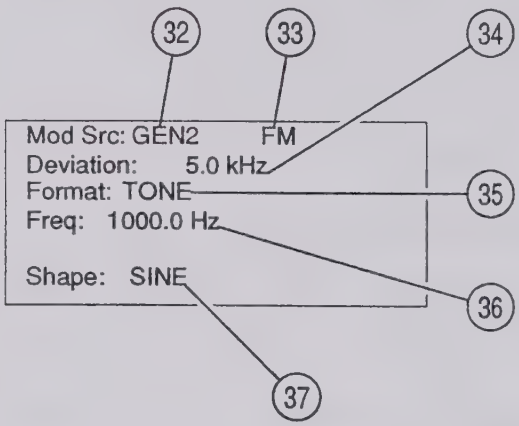
- If TONE is not selected Format (27):
  - Enter Code (30). Pressing CLEAR Soft Function Key F1 clears current entry.



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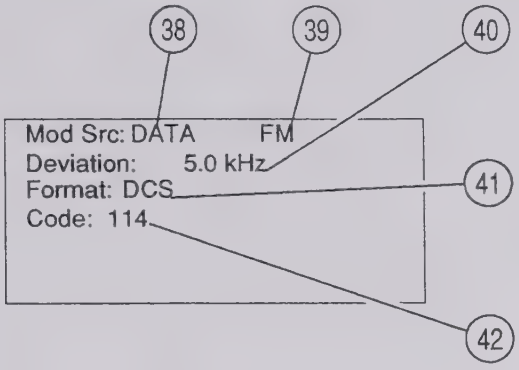
7. If Audio Generator 2 (GEN2) Operation is desired, set Modulation Source Block (9) as follows:
   - Press GEN2 Soft Function Key F2 to select GEN2 for Modulation Source (32).
   - Select Modulation Type (33) as follows:
     - Press OFF Soft Function Key F1 to deactivate GEN2.
     - Press AM Soft Function Key F2 if AM Modulation is desired.
     - Press FM Soft Function Key F3 if FM Modulation is desired.
     - Press PM Soft Function Key F4 if PM Modulation is desired.
   - Enter Deviation/Modulation Level (34). Range is 0.0 to 100 kHz for FM Modulation, 0% to 100% for AM Modulation and 0 to 10 Radians for PM Modulation.



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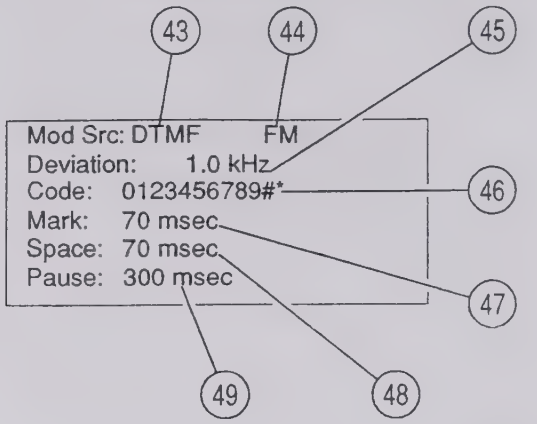
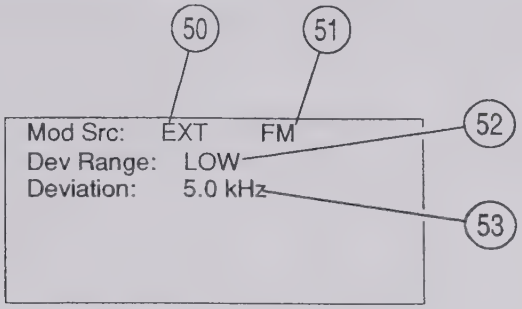
8. If DATA Generator (DATA) Operation is desired, set Modulation Source Block (9) as follows:

   - Press DATA Soft Function Key F3 to select DATA for Modulation Source (38).
   - Select Modulation Type (39) as follows:
     - Press OFF Soft Function Key F1 to deactivate DATA.
     - Press AM Soft Function Key F2 if AM Modulation is desired.
     - Press FM Soft Function Key F3 if FM Modulation is desired.
     - Press PM Soft Function Key F4 if PM Modulation is desired.
   - Enter Deviation/Modulation Level (40). Range is 0.0 to 100 kHz for FM Modulation, 0% to 100% for AM Modulation and 0 to 10 Radians for PM Modulation.
   - Select Format (41) as follows:
     - Press DCS Soft Function Key F1 to select DCS Format.
     - Press DCS/ Soft Function Key F2 to select DCS Inverted Format.
   - Enter desired Code (42). Range is 000 (Octal) to 777 (Octal).



9. If DTMF Generator (DTMF) Operation is desired, set Modulation Source Block (9) as follows:

   - Press DTMF Soft Function Key F4 to select DTMF for Modulation Source (43).
   - Select Modulation Type (44) as follows:
     - Press OFF Soft Function Key F1 to deactivate DTMF.
     - Press AM Soft Function Key F2 if AM Modulation is desired.
     - Press FM Soft Function Key F3 if FM Modulation is desired.
     - Press PM Soft Function Key F4 if PM Modulation is desired.
   - Enter Deviation/Modulation Level (45). Range is 0.0 to 100 kHz for FM Modulation, 0% to 100% for AM Modulation and 0 to 10 Radians for PM Modulation.
   - Enter DTMF Code (46).
   - Select desired Operation as follows:
     - Press CLEAR Soft Function Key F1 to clear code field of current data.
     - Press CONT Soft Function Key F2 to activate DTMF Code (46) in repeating loop.
     - Press BURST Soft Function Key F3 to activate DTMF Code (46) for one tone sequence.
     - Press KEY Soft Function Key F4 to set DATA ENTRY Keys as DTMF keypad.
   - Enter selected Mark Time (47) for DTMF tones. Range is 25 to 999 ms.
   - Enter selected Space Time (48) for DTMF tones. Range is 25 to 999 ms.
   - Enter selected Pause Time (49) for DTMF tones. Range is 25 to 999 ms.



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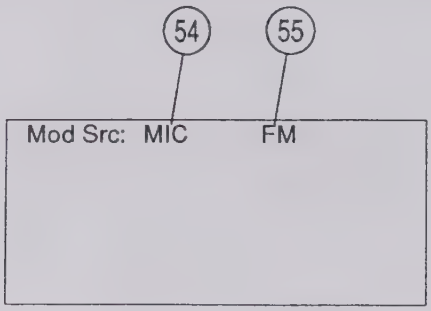
10. If External Modulation (EXT) Operation is desired, set Modulation Source Block (9) as follows:

- Press EXT Soft Function Key F5 to select EXT for Modulation Source (50).
- Select Modulation Type (51) as follows:
  - Press OFF Soft Function Key F1 to deactivate DTMF.
  - Press AM Soft Function Key F2 if AM Modulation is desired.
  - Press FM Soft Function Key F3 if FM Modulation is desired.
  - Press PM Soft Function Key F4 if PM Modulation is desired.
- If FM Modulation is selected, select Deviation Range (52) as follows:

  NOTE: If other sources are Frequency Modulated and total Deviation ≥20 kHz, Deviation Range is automatically set to High.

  - Press LOW Soft Function Key F1 for LOW Dev Range (52) setting for deviation <20 kHz.
  - Press HIGH Soft Function Key F2 for HIGH Dev Range (52) setting for deviation ≥20 to 100 kHz.



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11. If Microphone Modulation (MIC) Operation is desired, set Modulation Source Block (9) as follows:

    - Press MIC Soft Function Key F6 to select MIC for Modulation Source (54).
    - Select Modulation Type (55) as follows:
        - Press OFF Soft Function Key F1 to deactivate MIC.
        - Press AM Soft Function Key F2 if AM Modulation is desired.
        - Press FM Soft Function Key F3 if FM Modulation is desired.
        - Press PM Soft Function Key F4 if PM Modulation is desired.

STEP	PROCEDURE

12. Enter desired frequency in Duplex Receive RF Field (21). Frequency range is .2500 to 1000 MHz. Activate additional functions as required as follows:

    - To operate with Δ Function active:
        - Press Δ On/Off Soft Function Key F2 until Δ prompt appears.
        - Press Δ = Soft Function Key F1 to set Duplex Receive RF Field (21) change increment. Range is 0 to 500 MHz. Press RETURN Soft Function Key F6 to close window.
        - To deactivate Δ Function, press Δ On/Off Soft Function Key F2 until Δ prompt no longer appears beside Duplex Receive RF Field (21).
    - To activate Pair Function, press PAIR Soft Function Key F5. To deactivate Pair Function, press UNPAIR Soft Function Key F5.

13. If Frequency List Operation is desired instead of entering frequency in Duplex Receive RF Field (21), select Frequency List (20) Setting as follows:

    - Select Desired Frequency List (20) Type as follows:
        - Press T-Fwd Soft Function Key F2 to select Trunking Forward Channel List.
        - Press T-Rvs Soft Function Key F3 to select Trunking Reverse Channel List.
        - Press C-Fwd Soft Function Key F4 to select Cellular Forward Channel List.
        - Press C-Rvs Soft Function Key F5 to select Cellular Reverse Channel List.
        - Press FL Soft Function Key F6 to select User Defined Frequency List.
    - Press ON/OFF Soft Function Key F1 to active Frequency List (20) Setting.
    - If Cellular Channel List or User Defined Frequency List is selected, select channel/frequency number. Range of cellular channels is 1 to 1023. Range of Frequency List is 0 to 99.
    - If Trunking Channel List is selected, Select channel number. Select Reference Frequency by moving cursor to Reference Frequency Field and pressing ENTER. Select desired Reference Frequency using DATA SCROLL Keys or DATA SCROLL Spinner. Press ENTER Key.

    NOTE: Refer to para 3-3-8(A) for information on User Defined Frequency List.

14. Select Input (19) Connector as follows:

    - Press T/R Soft Function Key F1 to select T/R Connector.
    - Press ANT Soft Function Key F2 to select ANTENNA Connector .

15. Select Attenuation (22) as follows:

- Press 30 dB Soft Function Key F1 to select 30 dB attenuation for Input Signal.
- Press 0 dB Soft Function Key F2 to select no attenuation for Input Signal.

16. Select Demodulation Type (18) as follows:
    - Press FM Soft Function Key F1 to select FM demodulation.
    - Press AM dB Soft Function Key F2 to select AM demodulation.
    - Press PM dB Soft Function Key F3 to select PM demodulation.
17. Select IF Bandwidth (17) as follows:
    - Press 300 kHz Soft Function Key F1 to select 300 kHz IF Bandwidth Filter.
    - Press 15 kHz Soft Function Key F2 to select 15 kHz IF Bandwidth Filter.

    For the following guidelines, ΔF is Frequency Deviation in Hz, Φ is Phase Deviation in Radians, F_m is the Tone Modulation Frequency in Hz and IF is Minimum IF Filter Bandwidth. General Guidelines for IF Filter Selection are as follows:

    For FM Modulated Signals: $IF = 4(\Delta F + F_m)$

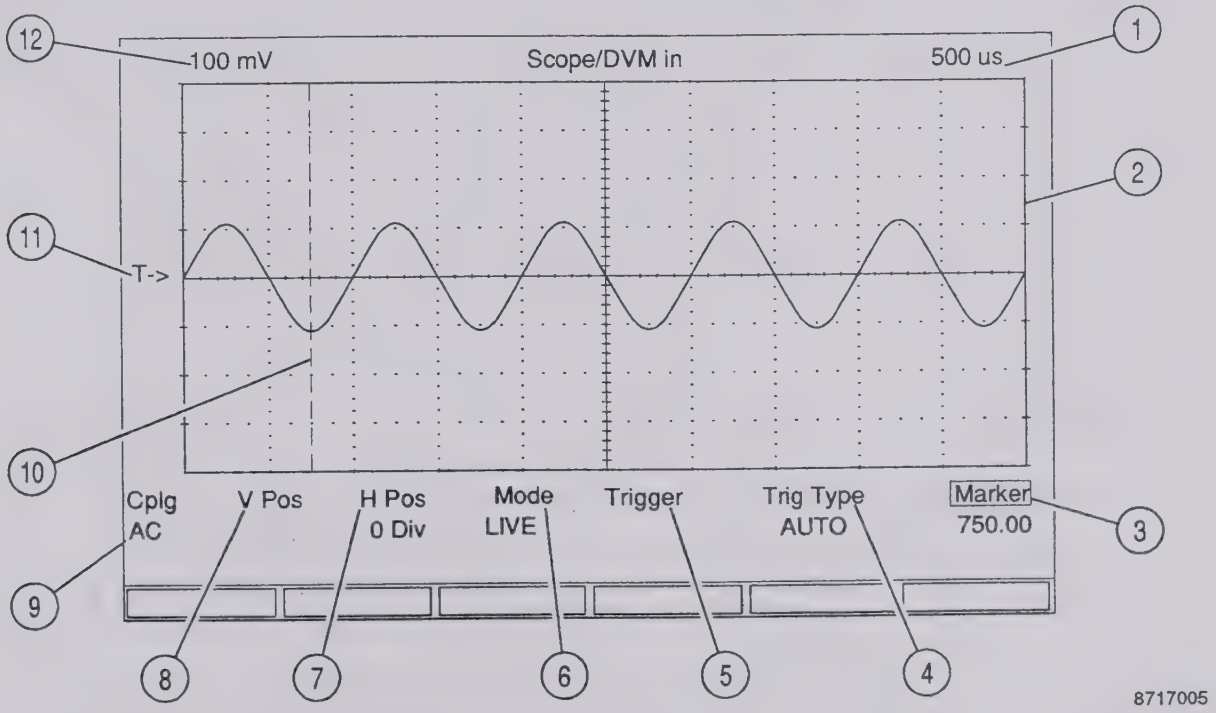
    For PM Modulated Signals: $IF = 4F_m(\Phi + 1)$

    For AM Modulated Signals: IF = 15 kHz, for $F_m \leq 1$ kHz
18. Select Tone/Data Type for TONE/DATA CODE Field as required. Press DECODE Soft Function Key F2 to activate decoding.
19. Select desired DISTORTION/SINAD Reading (13) as follows:
    - Press SINAD Soft Function Key F2 to select SINAD Reading.
    - Press DIST Soft Function Key F3 to select DISTORTION Reading.

4-5 OSCILLOSCOPE OPERATION SCREEN

Pressing the SCOPE INSTRUMENTS Key accesses the Oscilloscope Operation Screen. The purpose of the Independent Oscilloscope is to provide a test instrument that is independent of the other Operation Modes. What this section does is provide information for configuring the Oscilloscope in a generic sense. It is provided to explain how the active fields are edited and what selections are available. It is not designed to perform a specific test, but instead is provided as a reference for configuring the Independent Oscilloscope Operation Screen. To fully understand this section, the operator must read and understand para 3-3-4 and para 4-1.

Configure and operate the Independent Oscilloscope Operation Screen as follows:



STEP	PROCEDURE

1. Select Sweep (1). Selections include:

100 µs/Div	200 µs/Div	500 µs/Div
1 ms/Div	2 ms/Div	5 ms/Div
10 ms/Div	20 ms/Div	50 ms/Div
100 ms/Div		

2. Select Trigger Type (4) as follows:

   - Press NORM Soft Function Key F1 to select Normalized Trigger.
   - Press AUTO Soft Function Key F2 to select Auto Trigger.
   - Press 1 SHOT Soft Function Key F3 to select One Shot Trigger. Press 1 SHOT Soft Function Key F3 as needed to reset Trigger.

3. Set Trigger Level (11) as follows:
   - Move cursor to Trigger (5).
   - Press ENTER Key.
   - Use DATA SCROLL Spinner or DATA SCROLL Keys to set Trigger.
   - Press ENTER Key to complete edit.
4. Select Operation Mode (6) as follows:
   - Press LIVE Soft Function Key F2 to select Live Operation Mode.
   - Press AVG Soft Function Key F3 to select Average Operation Mode.
   - Press COMPARE Soft Function Key F4 to select Compare Operation Mode.
   - Press RECALL Soft Function Key F5 to select Recall Operation Mode.
   - Press STORE Soft Function Key F6 to select Store Operation Mode.
5. Select H POS (7) Offset as needed. Range is -10 to 10 Divisions.
6. Set Vertical Position of trace as needed by accessing V POS (8) and editing with DATA SCROLL Keys or DATA SCROLL Spinner.
7. Select Coupling (9). Selections include GND (Ground), AC and DC. Select as follows:
   - Press GND Soft Function Key F1 to select GND as Coupling (9).
   - Press AC Soft Function Key F2 to select AC as Coupling (9).
   - Press DC Soft Function Key F3 to select DC as Coupling (9).
8. Select Oscilloscope Scale (12). Selections available are dependent on Scope Source (4). Selections include:

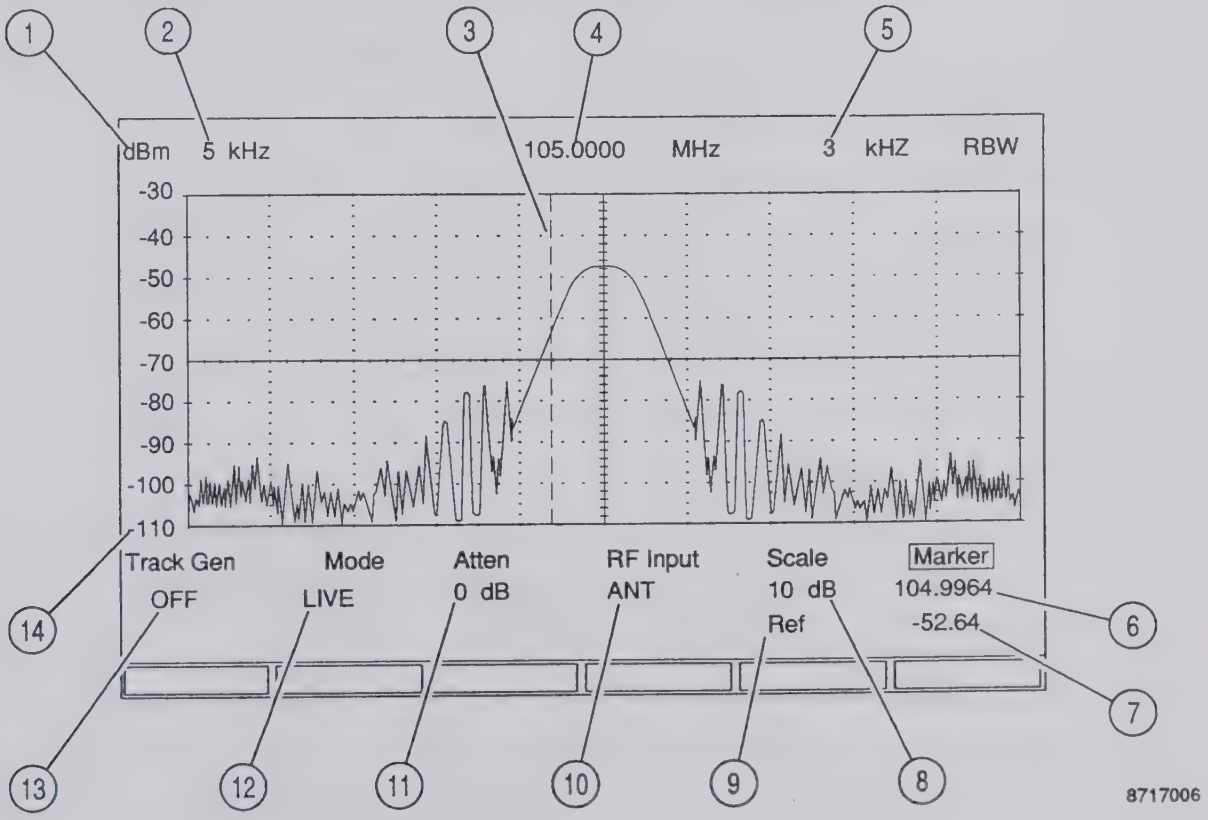
10 mV/Div	20 mV/Div	50 mV/Div
100 mV/Div	200 mV/Div	500 mV/Div
1 V/Div	2 V/Div	5 V/Div
10 V/Div	20 V/Div	50 V/Div

9. Activate Marker (10), as required, as follows:
   - With Cursor on Marker Position (3), press On/Off Soft Function Key F1.
   - Enter Desired Marker Position using DATA ENTRY Keys or DATA SCROLL Keys and/or DATA SCROLL Spinner.

4-6 SPECTRUM ANALYZER OPERATION SCREEN

Pressing the ANLYZ INSTRUMENTS Key accesses the Spectrum Analyzer Operation Screen. The purpose of the Independent Spectrum Analyzer is to provide a test instrument that is independent of the Operation Modes. What this section does is provide information in configuring the Spectrum Analyzer in a generic sense. It is provided to explain how the active fields are edited and what selections are available. It is not designed to perform a specific test, but instead is provided as a reference for configuring the Independent Spectrum Analyzer Operation Screen. To fully understand this section, the operator must read and understand para 3-3-5 and para 4-1.

Configure and operate the Independent Spectrum Analyzer Operation Screen as follows:



STEP	PROCEDURE

1. Set Center Frequency (4). Press Set Ref Soft Function Key F1 if current Center Frequency is to be used as Reference Frequency. Press Split Soft Function Key F5 If Split Screen Operation is desired. If Find Function Operation is desired, configure as follows:

   - Press Config Soft Function Key F4 to access Sweep Width Window. Enter Sweep Width. Press highlighted Config Soft Function Key F4 to close Window.

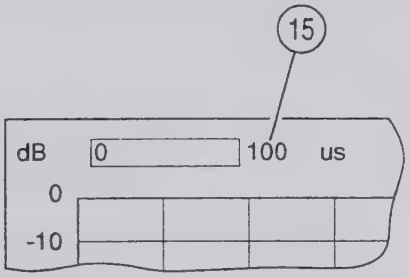
- Press Find Lvl Soft Function Key F3 to activate Marker for setting Find Level Reference. Use DATA SCROLL Spinner or DATA SCROLL Keys to edit Marker Level. Press Highlighted Find Lvl Soft Function Key F3 to complete operation.
- Press Find Soft Function Key F2 to activate Find Function.

2. Select Scan Width (2). Selections include zero scan and:

1 kHz/Div	2 kHz/Div	5 kHz/Div
10 kHz/Div	20 kHz/Div	50 kHz/Div
100 kHz/Div	200 kHz/Div	500 kHz/Div
1 MHz/Div		

3. Set Logarithmic Function (1) as follows:
   - Press dBm Soft Function Key F1 to select dBm.
   - Press dBµV Soft Function Key F2 to select dBµV.
   - Press dBmV Soft Function Key F3 to select dBmV.
   - Press dBV Soft Function Key F4 to select dBV.
   - Press dBµW Soft Function Key F5 to select dBµW.
   - Press dBW Soft Function Key F6 to select dBW.
4. Set Scale (8) as follows:
   - Press 10 dB Soft Function Key F1 to select 10 dB for Vertical Scale (13).
   - Press 2 dB Soft Function Key F1 to select 2 dB for Vertical Scale (13).
5. Select Mode (12) as follows:
   - Press PKHOLD Soft Function Key F1 to select Peak Hold Operation Mode.
   - Press LIVE Soft Function Key F2 to select Live Operation Mode.
   - Press AVG Soft Function Key F3 to select Average Operation Mode.
   - Press COMPARE Soft Function Key F4 to select Compare Operation Mode.
   - Press RECALL Soft Function Key F5 to select Recall Operation Mode.
   - Press STORE Soft Function Key F6 to select Store Operation Mode.
6. Activate Marker (3), as required, as follows:
   - With Cursor on Marker Position (6), press On/Off Soft Function Key F1.
   - Enter Desired Marker Position using DATA ENTRY Keys or DATA SCROLL Keys and/or DATA SCROLL Spinner.

7. Access Ref (9) Field to adjust Vertical Scale (14), as needed.
8. Select RF Input (10) as needed.
   - Press T/R Soft Function Key F1 to select T/R Connector.
   - Press ANT Soft Function Key F2 to select ANT Connector.
9. Select Attenuation (11) as needed.
   - Press 0 dB Soft Function Key F1 to select 0 dB Attenuation.
   - Press 30 dB Soft Function Key F2 to select 30 dB Attenuation.



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10. If Scan Width (2) is set to zero scan, enter Zero Scan Sweep (15). Selections Include:

100 µs/Div	200 µs/Div	500 µs/Div
1 ms/Div	2 ms/Div	5 ms/Div
10 ms/Div	20 ms/Div	50 ms/Div
100 ms/Div		

4-7 AUDIO/DATA/SIGNALING GENERATORS

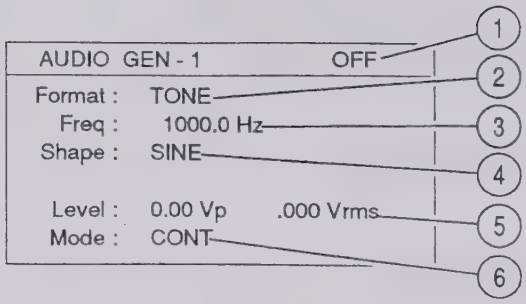
Pressing the AUDIO GEN INSTRUMENTS Key accesses the Independent Audio/Data/Signaling Generators Operation Screen. The purpose of the Independent Audio/Data/Signaling Generators is to provide baseband signal generators that are independent of the other Operation Modes. What this section does is provide information in configuring the COM-120A Audio/Data/Signaling Generators. Configuring the Audio/Data/Signaling Generators is covered in a generic sense. It is provided to explain how each of the active fields are edited and what selections are available. It is not designed to perform a specific test, but instead is provided as a reference. To fully understand this section, the operator must read and understand para 3-3-6 and para 4-1.

The Audio/Data/Signaling Generators Operation Screen is composed of four sections, each of which represents a different generator. These generators are covered separately. Restrictions that apply to the generators are primarily related to the output level. The sum of the generators output level should not exceed 2.5 volts in X1 mode and 25 mV in /100 (divide by 100) mode. If /100 mode is selected, all signal generators are affected.

Section	Title	Page
4-7-1	Audio Generator 1 Operation	4-122
4-7-2	Audio Generator 2 Operation	4-124
4-7-3	DATA Generator Operation	4-125
4-7-4	DTMF Generator Operation	4-126

4-7-1 AUDIO GENERATOR 1 OPERATION

Configure and operate Audio Generator 1 as follows:



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STEP	PROCEDURE

1. With cursor at Audio Generator 1 Prompt (1), press GEN1 Soft Function Key F1 until Audio Generator 1 Prompt displays ***ON***.

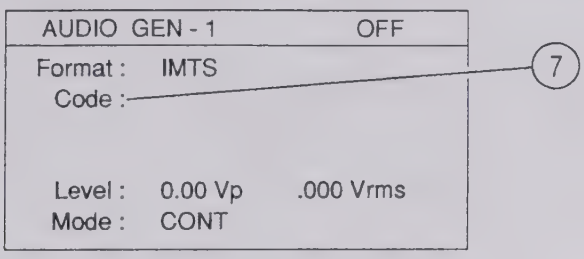
2. Select Format (2). Formats available include TONE and USER:

3. If TONE is selected as Format (2):

    - Enter Audio Tone Frequency (3). Range is 0 to 10000 Hz.
    - Select Shape (4) of Wave as follows:
        - Press SINE Soft Function Key F1 to select SINE Wave Shape.
        - Press SQUARE Soft Function Key F2 to select SQUARE Wave Shape.
        - Press RAMP Soft Function Key F3 to select RAMP Wave Shape.
        - Press TRIANGLE Soft Function Key F4 to select TRIANGLE Wave Shape.

4. If USER is selected as Format (2):

    - Press CONFIG Soft Function Key F4 to access Configuration Window for configuring User Selectable Frequency and Duration for codes 0 through 9 and A through T. Configure as follows:
        - Enter desired frequencies and durations for codes. Range of frequencies are 0 to 9999.9 Hz. Range of durations are 0 to 99.999 seconds. Use PG UP Soft Function Key F1 to scroll up through Configuration Window. Use PG DN to scroll down through Configuration Window. Use FILL Soft Function Key F3 to fill remainder of current column with value of current cursor position.
        - Press RETURN Soft Function Key F6 to exit Window.



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- Enter Code (7). Pressing CLEAR Soft Function Key F1 clears current code entry.

5. Enter Level (5). Selections range from 0 to 2.5 Vp in X1 (times 1) Mode and 0 to 25.0 mVp in /100 (divide by 100) Mode. Select Attenuation Mode as follows:

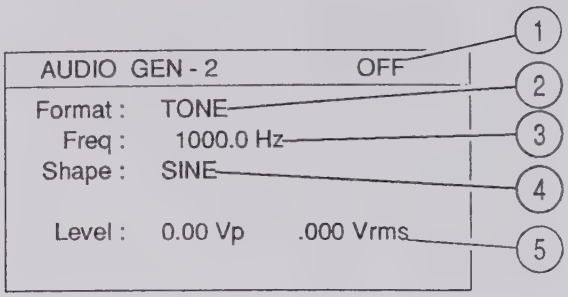
   - Press X1 Soft Function Key F1 to select X1 (times 1) Attenuation Mode.
   - Press /100 Soft Function Key F2 to select /100 (divide by 100) Attenuation Mode.

6. Select Mode (6) as follows:

   - Press CONT Soft Function Key F2 to select continuous transmission of signal.
   - Press BURST Soft Function Key F3 if single transmission of selected signal. If TONE is selected as Format (2), enter duration time for TONE Burst in T= field. Time duration ranges from 0 to 30 seconds.

4-7-2 AUDIO GENERATOR 2 OPERATION

Configure and operate Audio Generator 2 as follows:



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STEP	PROCEDURE

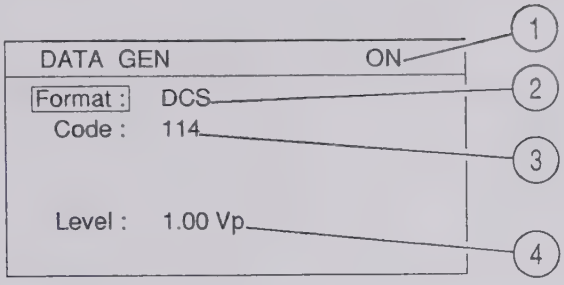
1. With cursor at Audio Generator 2 Prompt (1), press GEN2 Soft Function Key F2 until Audio Generator 2 Prompt displays ***ON***.

2. Enter Level (5). Selections range from 0 to 2.5 Vp in X1(times 1) Mode and 0 to 25.0 mVp in /100 (divide by 100) Mode. Select Attenuation Mode as follows:

   - Press X1 Soft Function Key F1 to select X1 (times 1) Attenuation Mode.
   - Press /100 Soft Function Key F2 to select /100 (divide by 100) Attenuation Mode.

4-7-3 DATA GENERATOR OPERATION

Configure and operate DATA Generator as follows:



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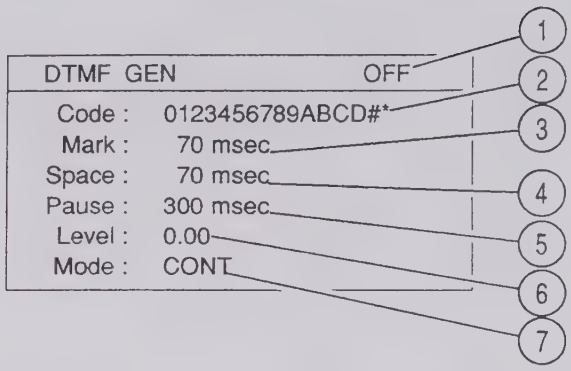
STEP	PROCEDURE

1. With cursor at DATA Generator Prompt (1), press DATA Soft Function Key F3 until DATA Generator Prompt displays ***ON***.
2. Select Format (2) as follows:
   - Press DCS Soft Function Key F1 to select DCS Format.
   - Press DCS/ Soft Function Key F2 to select DCS Inverted Format.
3. Enter desired Code (3). Range is 000 (Octal) to 777 (Octal).
4. Enter Level (4). Selections range from 0 to 2.5 Vp in X1 (times 1) Mode and 0 to 25.0 mVp in /100 (divide by 100) Mode. Select Attenuation Mode as follows:
   - Press X1 Soft Function Key F1 to select X1 (times 1) Attenuation Mode.
   - Press /100 Soft Function Key F2 to select /100 (divide by 100) Attenuation Mode.

4-7-4 DTMF GENERATOR OPERATION

Configure and operate DTMF Generator as follows:



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STEP	PROCEDURE

1. With cursor at DTMF Generator Prompt (1), press DTMF Soft Function Key F4 until DTMF Generator Prompt displays ***ON***.
2. Enter DTMF Code (2).
   - Press CLEAR Soft Function Key F1 to clear code field of current data.
3. Enter selected Mark Time (3) for DTMF tones. Range is 25 to 999 ms.
4. Enter selected Space Time (4) for DTMF tones. Range is 25 to 999 ms.
5. Enter selected Pause Time (5) for DTMF tones. Range is 25 to 999 ms.
6. Enter Level (6). Selections range from 0 to 2.5 Vp in X1 (times 1) Mode and 0 to 25.0 mVp in /100 (divide by 100) Mode. Select Attenuation Mode as follows:
   - Press X1 Soft Function Key F1 to select X1 (times 1) Attenuation Mode.
   - Press /100 Soft Function Key F2 to select /100 (divide by 100) Attenuation Mode.
7. Select desired Operation as follows:
   - Press CONT Soft Function Key F2 to activate DTMF Code (2) in repeating loop.
   - Press BURST Soft Function Key F3 to activate DTMF Code (2) for one tone sequence.
   - Press KEY Soft Function Key F4 to set DATA ENTRY Keys as DTMF keypad.

4-8 METERS OPERATION

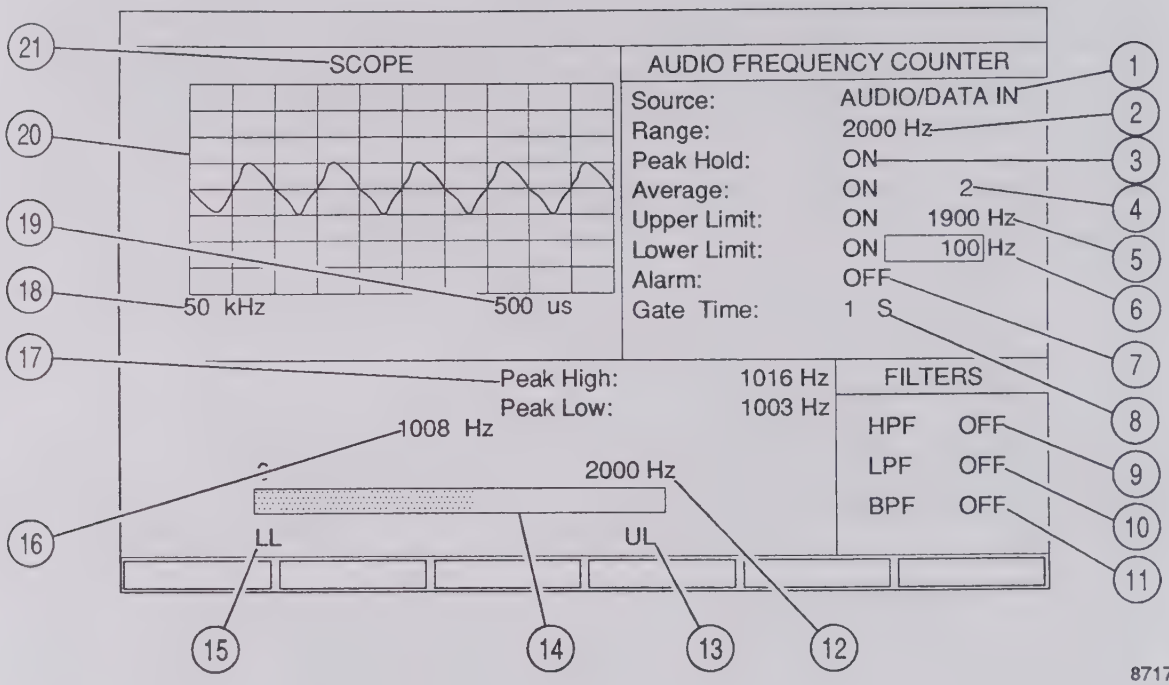
Pressing the MTRS INSTRUMENTS Key accesses the Independent Meters Menu. The purpose of the Independent Meters is to provide test equipment that is independent of the Operation Modes. What this section does is provide information in configuring the COM-120A Independent Meters. Configuring the Independent Meters is covered in a generic sense. It is provided to explain how each of the active fields are edited and what selections are available. It is not designed to preform a specific test, but instead is provided as a reference. To fully understand this section, the operator must read and understand para 3-3-7 and para 4-1.

From the Meters Menu, the operator can access the Independent Meters by placing the cursor on the number of the desired meter and pressing the ENTER Key.

Section	Title	Page
4-8-1	Audio Frequency Counter Operation	4-128
4-8-2	SINAD Meter Operation	4-131
4-8-3	Digital Voltmeter Operation	4-134
4-8-4	Distortion Meter Operation	4-136

4-8-1 AUDIO FREQUENCY COUNTER OPERATION

Configure and operate Audio Frequency Counter as follows:



STEP	PROCEDURE

1. Select Source (1) as follows:
   - Press AUD/DAT Soft Function Key F1 to select AUDIO/DATA IN Connector as Source (1).
   - Press RF POW Soft Function Key F2 to select RF Power Meter input line as Source (1).
   - Press EXT MOD Soft Function Key F3 to select EXT MOD Connector as Source (1).
   - Press SC/DVM Soft Function Key F4 to select SCOPE/DVM Connector as Source (1).
2. Set Range (2). Selections include Autorange, 200 Hz, 2 kHz and 20 kHz.
3. If Peak Hold Function is desired, configure as follows:
   - With cursor on Peak Hold (3), press OFF/ON Soft Function Key F1 until Peak Hold (3) displays ***ON***.
   - Peak Hold Function can be reset as desired by pressing RST PK Soft Function Key F5 where displayed.

- Set Peak Hold Function to OFF by pressing OFF/ON Soft Function Key F1 until Peak Hold (3) displays ***OFF***.

4. If Average Function is desired, configure as follows:

   - With cursor on Average (4), press OFF/ON Soft Function Key F1 until Average (7) displays ***ON*** and Sample Number appears.
   - Enter Sample Number. Range is 2 to 10.
   - Set Average Function to OFF by pressing OFF/ON Soft Function Key F1 until Average (4) displays ***OFF***.

5. If Upper Limit Function is desired, configure as follows:

   - With cursor on Upper Limit (5), press OFF/ON Soft Function Key F1 until Upper Limit (5) displays ***ON*** and Limit Value appears.
   - Enter Limit Value. Range is 0 to 20000 Hz.
   - Set Upper Limit Function to OFF by pressing OFF/ON Soft Function Key F1 until Upper Limit (5) displays ***OFF***.

6. If Lower Limit Function is desired, configure as follows:

   - With cursor on Lower Limit (6), press OFF/ON Soft Function Key F1 until Lower Limit (6) displays ***ON*** and Limit Value appears.
   - Enter Limit Value. Range is 0 to 20000 Hz.
   - Set Lower Limit Function to OFF by pressing OFF/ON Soft Function Key F1 until Lower Limit (6) displays ***OFF***.

7. If Alarm Function is desired, configure as follows:

   - With cursor on Alarm (7), press OFF/ON Soft Function Key F1 until Alarm (10) displays ***ON***.
   - Set Alarm Function to OFF by pressing OFF/ON Soft Function Key F1 until Alarm (7) displays ***OFF***.

8. Set Gate Time (8). Selections include 1 and 10 seconds.

9. Set High-Pass Filter (9) as follows:

   - Press OFF Soft Function Key F1 to set High-Pass Filter (9) to ***OFF***.
   - Press 300 Hz Soft Function Key F2 to set High-Pass Filter (9) to ***300 Hz***.
   - Press 4 kHz Soft Function Key F3 to set High-Pass Filter (9) to ***4 kHz***.

10. Set Low-Pass Filter (10) as follows:

    - Press OFF Soft Function Key F1 to set Low-Pass Filter (10) to ***OFF***.
    - Press 300 Hz Soft Function Key F2 to set Low-Pass Filter (10) to ***300 Hz***.
    - Press 4 kHz Soft Function Key F3 to set Low-Pass Filter (10) to ***4 kHz***.
    - Press 20 kHz Soft Function Key F4 to set Low-Pass Filter (10) to ***20 kHz***.

11. Set Bandpass Filter (11) as follows:

    - Press OFF Soft Function Key F1 to set Bandpass Filter (11) to ***OFF***.
    - Press C-MSG Soft Function Key F2 to set Bandpass Filter (11) to C-Message Weighted Filter (***C-MSG***).

12. Set Scope Scale (18). Selections change depending on selected Source (1). Selections include:

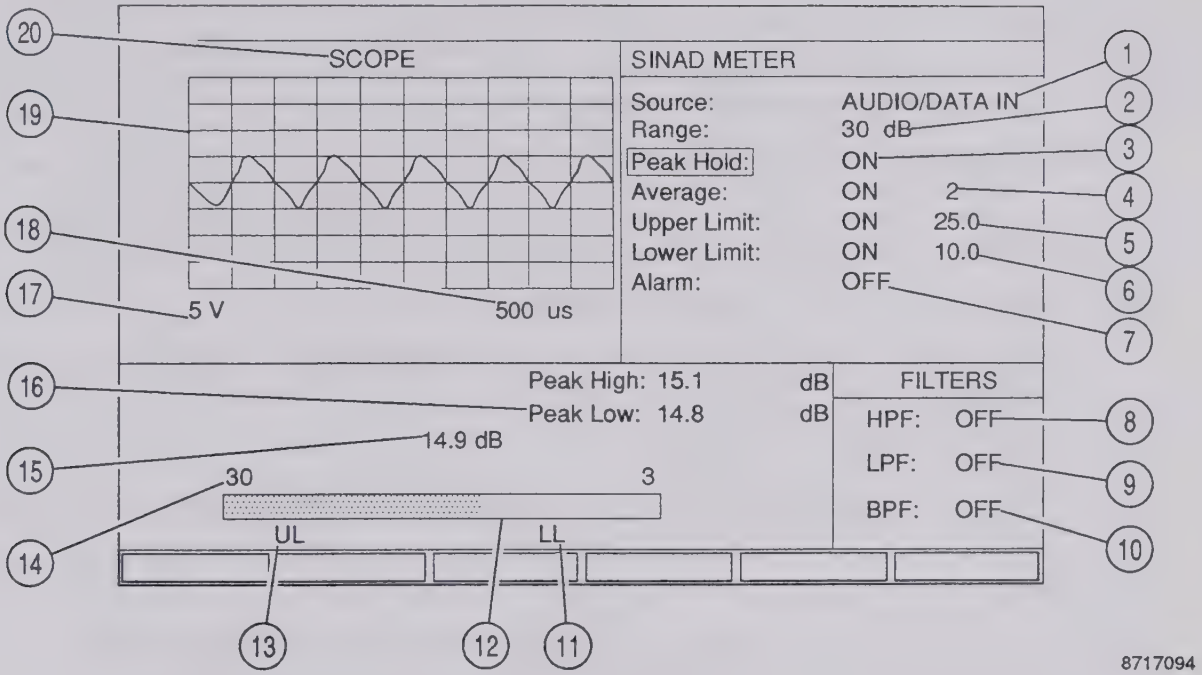
Source (1)	Scale
AUD/DAT	0.02, 0.04, 0.10, 0.20, 0.40, 1.00
RF POW	LOW(2 mW to 20 mW signal) MED (>20 mW to 2 W signal) HIGH (>2 W to 200 W signal
EXT MOD	100, 200, 500 mv/Div 1, 2, 5 V/Div
SC/DVM	10, 20, 50, 100, 200, 500 mV/Div 1, 2, 5, 10, 20, 50 V/Div

13. Set Scope Sweep (19). Selections include:

100 µs/Div	200 µs/Div	500 µs/Div
1 ms/Div	2 ms/Div	5 ms/Div
10 ms/Div	20 ms/Div	50 ms/Div
100 ms/Div		

4-8-2 SINAD METER OPERATION

Configure and operate SINAD Meter as follows:



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STEP	PROCEDURE

1. Select Source (1) as follows:
   - Press AUD/DAT Soft Function Key F1 to select AUDIO/DATA IN Connector as Source (1).
   - Press SC/DVM Soft Function Key F2 to select SCOPE/DVM Connector as Source (1).
2. Select Range (2) as follows:
   - Press 15 dB Soft Function Key F1 to select 15 dB as Range (2).
   - Press 30 dB Soft Function Key F2 to select 30 dB as Range (2).
   - Press AUTO Soft Function Key F3 to select Autorange for Range (2).
3. If Peak Hold Function is desired, configure as follows:
   - With cursor on Peak Hold (3), press OFF/ON Soft Function Key F1 until Peak Hold (3) displays ***ON***.
   - Peak Hold Function can be reset as desired by pressing RST PK Soft Function Key F5 where displayed.

- Set Peak Hold Function to OFF by pressing OFF/ON Soft Function Key F1 until Peak Hold (3) displays ***OFF***.

4. If Average Function is desired, configure as follows:

   - With cursor on Average (4), press OFF/ON Soft Function Key F1 until Average (4) displays ***ON*** and Sample Number appears.
   - Enter Sample Number. Range is 2 to 10.
   - Set Average Function to OFF by pressing OFF/ON Soft Function Key F1 until Average (4) displays ***OFF***.

5. If Upper Limit Function is desired, configure as follows:

   - With cursor on Upper Limit (5), press OFF/ON Soft Function Key F1 until Upper Limit (5) displays ***ON*** and Limit Value appears.
   - Enter Limit Value. Range is 0 to 30.
   - Set Upper Limit Function to OFF by pressing OFF/ON Soft Function Key F1 until Upper Limit (5) displays ***OFF***.

6. If Lower Limit Function is desired, configure as follows:

   - With cursor on Lower Limit (6), press OFF/ON Soft Function Key F1 until Lower Limit (6) displays ***ON*** and Limit Value appears.
   - Enter Limit Value. Range is 0 to 30.
   - Set Lower Limit Function to OFF by pressing OFF/ON Soft Function Key F1 until Lower Limit (6) displays ***OFF***.

7. If Alarm Function is desired, configure as follows:

   - With cursor on Alarm (7), press OFF/ON Soft Function Key F1 until Alarm (7) displays ***ON***.
   - Set Alarm Function to OFF by pressing OFF/ON Soft Function Key F1 until Alarm (7) displays ***OFF***.

8. Set High-Pass Filter (8) as follows:

   - Press OFF Soft Function Key F1 to set High-Pass Filter (8) to ***OFF***.
   - Press 300 Hz Soft Function Key F2 to set High-Pass Filter (8) to ***300 Hz***.
   - Press 4 kHz Soft Function Key F3 to set High-Pass Filter (8) to ***4 kHz***.

9. Set Low-Pass Filter (9) as follows:

   - Press OFF Soft Function Key F1 to set Low-Pass Filter (9) to ***OFF***.

- Press 300 Hz Soft Function Key F2 to set Low-Pass Filter (9) to ***300 Hz***.
- Press 4 kHz Soft Function Key F3 to set Low-Pass Filter (9) to ***4 kHz***.
- Press 20 kHz Soft Function Key F4 to set Low-Pass Filter (9) to ***20 kHz***.

10. Set Bandpass Filter (10) as follows:
    - Press OFF Soft Function Key F1 to set Bandpass Filter (10) to ***OFF***.
    - Press C-MSG Soft Function Key F2 to set Bandpass Filter (10) to C-Message Weighted Filter (***C-MSG***).
11. Set Scope Scale (12). Selections change depending on selected Source (1). Selections include:

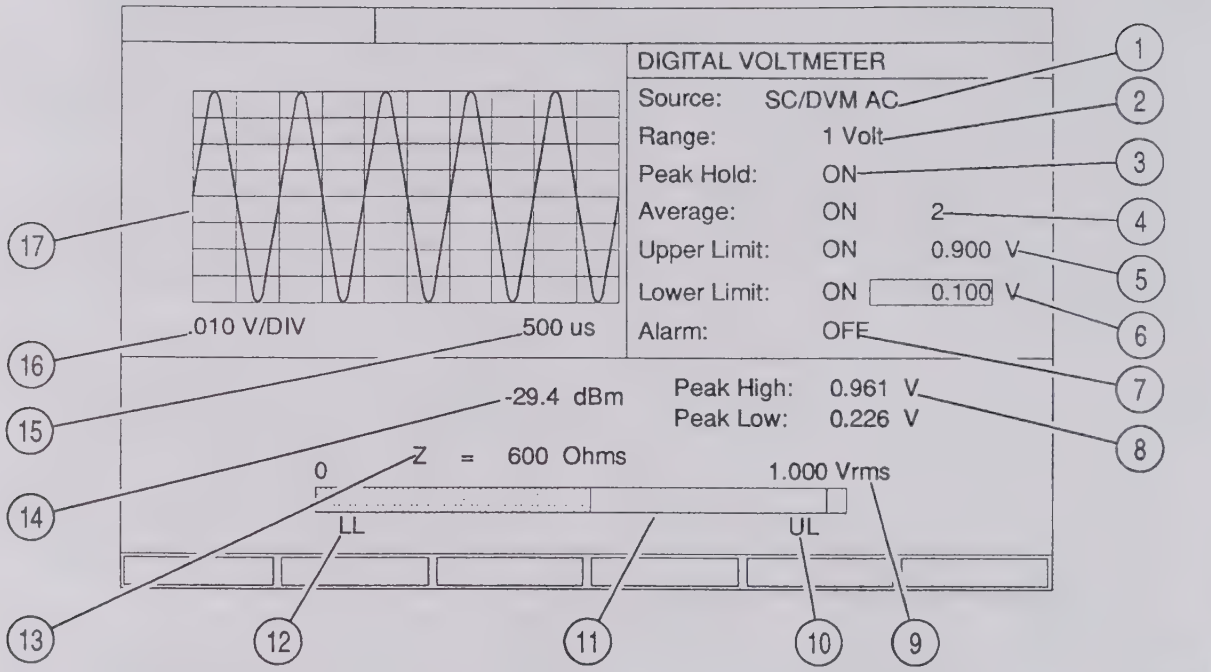
Source (1)	Scale
AUD/DAT	0.02, 0.04, 0.10, 0.20, 0.40, 1.00
SC/DVM	10, 20, 50, 100, 200, 500 mV/Div 1, 2, 5, 10, 20, 50 V/Div

12. Set Scope Sweep (18). Selections include:

100 µs/Div	200 µs/Div	500 µs/Div
1 ms/Div	2 ms/Div	5 ms/Div
10 ms/Div	20 ms/Div	50 ms/Div
100 ms/Div		

4-8-3 DIGITAL VOLTMETER OPERATION

Configure and operate Digital Voltmeter as follows:



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STEP	PROCEDURE

1. Select Source (1). Selections include:

SC/DVM DC	SC/DVM AC	SC/DVM GND)
AUDIO/DATA IN	EXT MOD IN	

2. Select Range (2). Selection include:

50 mV/Div	100 mV/Div	200 mV/Div
500 mV/Div	1 V/Div	2 V/Div
5 V/Div	10 V/Div	20 V/Div
50 V/Div	100 V/Div	200 V/Div

3. If Peak Hold Function is desired, configure as follows:

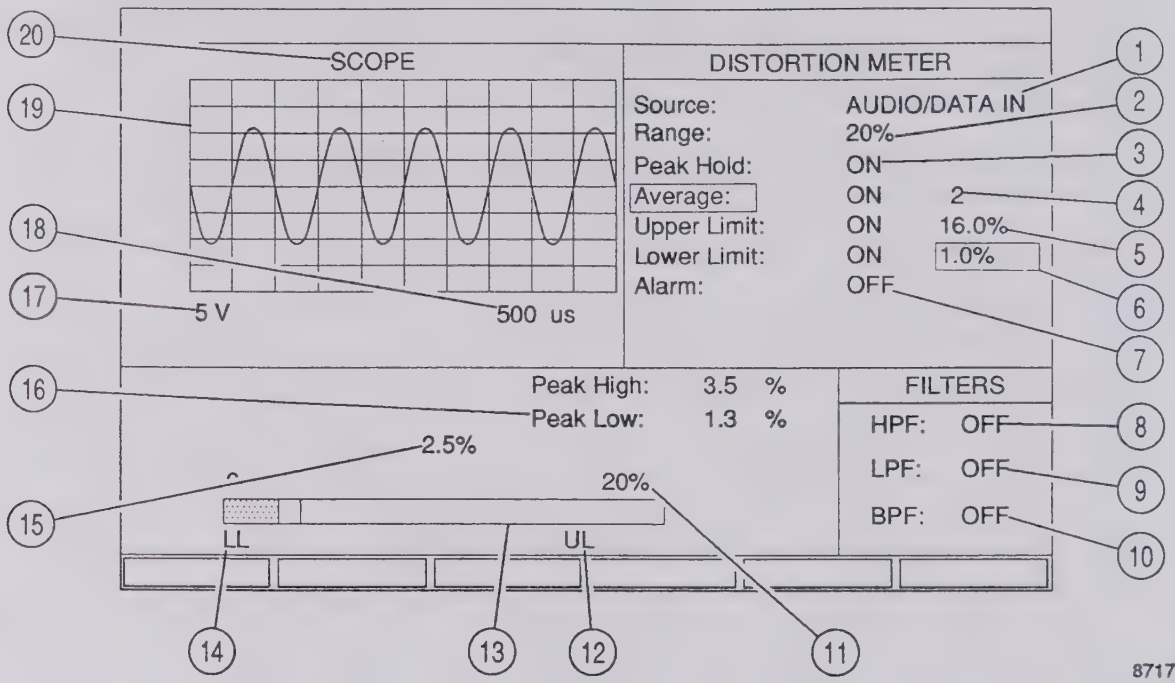
   - With cursor on Peak Hold (3), press OFF/ON Soft Function Key F1 until Peak Hold (3) displays ***ON***.
   - Peak Hold Function can be reset as desired by pressing RST PK Soft Function Key F5 where displayed.
   - Set Peak Hold Function to OFF by pressing OFF/ON Soft Function Key F1 until Peak Hold (3) displays ***OFF***.

4. If Average Function is desired, configure as follows:
   - With cursor on Average (4), press OFF/ON Soft Function Key F1 until Average (4) displays ***ON*** and Sample Number appears.
   - Enter Sample Number. Range is 2 to 10.
   - Set Average Function to OFF by pressing OFF/ON Soft Function Key F1 until Average (4) displays ***OFF***.
5. If Upper Limit Function is desired, configure as follows:
   - With cursor on Upper Limit (5), press OFF/ON Soft Function Key F1 until Upper Limit (5) displays ***ON*** and Limit Value appears.
   - Enter Limit Value. Range is 0 to 200 V.
   - Set Upper Limit Function to OFF by pressing OFF/ON Soft Function Key F1 until Upper Limit (5) displays ***OFF***.
6. If Lower Limit Function is desired, configure as follows:
   - With cursor on Lower Limit (6), press OFF/ON Soft Function Key F1 until Lower Limit (6) displays ***ON*** and Limit Value appears.
   - Enter Limit Value. Range is 0 to 200 V.
   - Set Lower Limit Function to OFF by pressing OFF/ON Soft Function Key F1 until Lower Limit (6) displays ***OFF***.
7. If Alarm Function is desired, configure as follows:
   - Press OFF/ON Soft Function Key F1 until Alarm (7) displays ***ON***.
   - Set Alarm Function to OFF by pressing OFF/ON Soft Function Key F1 until Alarm (7) displays ***OFF***.
8. If Source (1) is SC/DVM AC, AUDIO/DATA IN or EXT MOD IN, set Reading (14) Units as follows:
   - Press Vrms Soft Function Key F1 to set Reading (13) Units to ***Vrms***.
   - Press dBm Soft Function Key F1 to set Reading (13) Units to ***dBm***. Set Impedance (13) for desired load. Place required load on connector specified by Source (1).
   - Press dB Soft Function Key F1 to set Reading (13) Units to ***dB***.
9. Set Scope Sweep (15). Selections include:

100 µs/Div	200 µs/Div	500 µs/Div
1 ms/Div	2 ms/Div	5 ms/Div
10 ms/Div	20 ms/Div	50 ms/Div
100 ms/Div		

4-8-4 DISTORTION METER OPERATION

Configure and operate Distortion Meter as follows:



STEP	PROCEDURE

1. Select Source (1) as follows:

   - Press AUD/DAT Soft Function Key F1 to select AUDIO/DATA IN Connector as Source (1).
   - Press SC/DVM Soft Function Key F2 to select SCOPE/DVM Connector as Source (1).

2. If Peak Hold Function is desired, configure as follows:

   - With cursor on Peak Hold (3), press OFF/ON Soft Function Key F1 until Peak Hold (3) displays ***ON***.
   - Peak Hold Function can be reset as desired by pressing RST PK Soft Function Key F5 where displayed.
   - Set Peak Hold Function to OFF by pressing OFF/ON Soft Function Key F1 until Peak Hold (3) displays ***OFF***.

3. If Average Function is desired, configure as follows:

   - With cursor on Average (4), press OFF/ON Soft Function Key F1 until Average (4) displays ***ON*** and Sample Number appears.

- Enter Sample Number. Range is 2 to 10.
- Set Average Function to OFF by pressing OFF/ON Soft Function Key F1 until Average (4) displays ***OFF***.

4. If Upper Limit Function is desired, configure as follows:
   - With cursor on Upper Limit (5), press OFF/ON Soft Function Key F1 until Upper Limit (5) displays ***ON*** and Limit Value appears.
   - Enter Limit Value. Range is 0% to 20%.
   - Set Upper Limit Function to OFF by pressing OFF/ON Soft Function Key F1 until Upper Limit (5) displays ***OFF***.
5. If Lower Limit Function is desired, configure as follows:
   - With cursor on Lower Limit (6), press OFF/ON Soft Function Key F1 until Lower Limit (6) displays ***ON*** and Limit Value appears.
   - Enter Limit Value. Range is 0% to 20%.
   - Set Lower Limit Function to OFF by pressing OFF/ON Soft Function Key F1 until Lower Limit (6) displays ***OFF***.
6. If Alarm Function is desired, configure as follows:
   - With cursor on Alarm (7), press OFF/ON Soft Function Key F1 until Alarm (7) displays ***ON***.
   - Set Alarm Function to OFF by pressing OFF/ON Soft Function Key F1 until Alarm (7) displays ***OFF***.
7. Set High-Pass Filter (8) as follows:
   - Press OFF Soft Function Key F1 to set High-Pass Filter (8) to ***OFF***.
   - Press 300 Hz Soft Function Key F2 to set High-Pass Filter (8) to ***300 Hz***.
   - Press 4 kHz Soft Function Key F3 to set High-Pass Filter (8) to ***4 kHz***.
8. Set Low-Pass Filter (9) as follows:
   - Press OFF Soft Function Key F1 to set Low-Pass Filter (9) to ***OFF***.
   - Press 300 Hz Soft Function Key F2 to set Low-Pass Filter (9) to ***300 Hz***.
   - Press 4 kHz Soft Function Key F3 to set Low-Pass Filter (9) to ***4 kHz***.
   - Press 20 kHz Soft Function Key F4 to set Low-Pass Filter (9) to ***20 kHz***.
9. Set Bandpass Filter (10) as follows:

- Press OFF Soft Function Key F1 to set Bandpass Filter (10) to ***OFF***.
- Press C-MSG Soft Function Key F2 to set Bandpass Filter (10) to C-Message Weighted Filter (***C-MSG***).

10. Set Scope Scale (17). Selections change depending on selected Source (1). Selections include:

Source (1)	Scale
AUD/DAT	0.02, 0.04, 0.10, 0.20, 0.40, 1.00
SC/DVM	10, 20, 50, 100, 200, 500 mV/Div 1, 2, 5, 10, 20, 50 V/Div

11. Set Scope Sweep (18). Selections include:

100 µs/Div	200 µs/Div	500 µs/Div
1 ms/Div	2 ms/Div	5 ms/Div
10 ms/Div	20 ms/Div	50 ms/Div
100 ms/Div		

SECTION 5 - REMOTE OPERATION

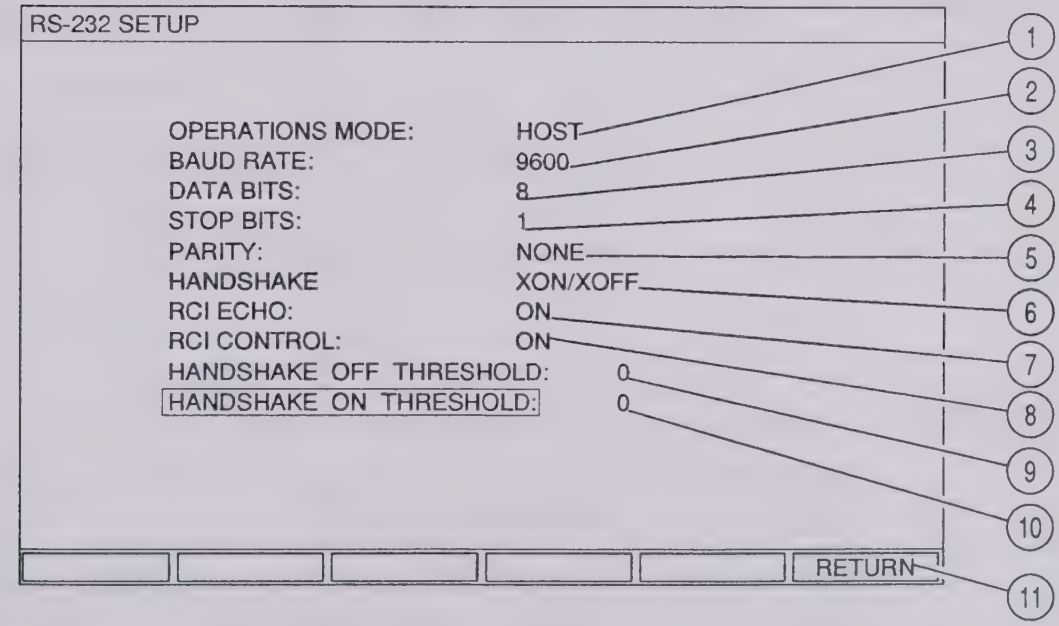
5-1 GENERAL

The COM-120A is designed to operate remotely through an external controller. All data available through Front Panel Operation is available through the External Controller. The External Controller can generate any command available except to turn power on.

Remote Operation can be performed using the RS-232 Connector or the GPIB Connector (with Option 13 installed). Refer to Appendix A for pin-out information. Location of both connectors is shown in Figure 3-2.

It is important that the operator be familiar with this manual and the Front Panel Operation of the COM-120A before initiating Remote Operations. Refer to Section 3, as needed, for information regarding Controls, Connectors, Indicators and Operation Screens.

5-2 CONFIGURING THE COM-120A FOR REMOTE OPERATION USING RS-232 CONNECTOR



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STEP	PROCEDURE

1. Connect external control device to COM-120A.
2. Press SETUP MEMORY Key to access Setup Screen.
3. Use DATA SCROLL Keys to move cursor to ***5. RS-232 SETTINGS***. Press ENTER Key.
4. Set Operations Mode (1) to ***HOST***.
5. Set BAUD RATE (2) to match external control device.

6. Set DATA BITS (3) to match external control device.
7. Set STOP BITS (4) to match external control device.
8. Set Parity Bits (5) to match external control device.
9. Set Handshake (6) to match external control device.
10. Set RCI Echo (7) to ***ON***.
11. Set RCI Control (8) to ***ON***.
12. Set HANDSHAKE ON THRESHOLD (9) and HANDSHAKE OFF THRESHOLD (10), only as required, to match external control device.

5-3 MANDATORY IEEE 488.2 COMMANDS

Mnemonic	Command
*CLS	Clear Status Command
*ESE X	Standard Event Status Enable, x = 0 to 255
*ESE?	Standard Event Status Enable Query
*ESR?	Standard Event Status Register Query
*IDN?	Identification Query
*OPC	Operation Complete Command
*OPC?	Operation Complete Query
*OPT?	Returns Software Option of Test Set
*RST	Restart Command
*SRE X	Service Request Command, x = 0 to 255
*SRE?	Service Request Enable Query
*STB?	Read Status Byte Query
*TST?	Self Test Query
*WAI	Wait-To-Continue Command

Table 5-1 Mandatory GPIB Commands

5-4 COM-120A SPECIFIC COMMANDS

The following list of commands is broken up by function. Within the list, the commands are listed in hierarchal order. Each hierarchy is separated by a colon(:). For example, the command "RECeiver:INPut:ATTenuation 30" is listed as follows:

```
RECeiver
   :INPut
      :ATTenuation v                                  Set input ATTenuation.
```

The v is a variable parameter. At least one space is required between commands and parameters. When more than one parameter is required, they are separated by a comma (,). The example given is a command to set the COM-120A. Another type of command used is a Query Command. Query Commands contain a question mark (?) at the end of the command and before any parameters.

Commands are listed in upper and lower case letters. This is to identify the short and long form of the command. The upper case letters identify the short form of the command. The upper and lower case letters, together, identify the long form of the command.

ANALYZER COMMANDS

NOTE1: Assumed units are MHz. Valid units are Hz, kHz, MHz or GHz. Accepted frequency range is from 250 kHz through 1 GHz in 0.1 kHz steps.

ANALyzer		
:ADJust		Adjusts vertical scale using internal -40 dB reference signal.
:FIND		
:INITiate		Starts Find function.
:LEVel v	0 to 255	Sets Find level in pixels. Top of Screen is 255.
:LEVel?		Queries Find level.
:SWEep		
:WIDth v	.2000 to 500.0000	Sets Find sweep width in MHz with .0001 MHz increments.
:WIDth?		Returns sweep width in MHz.
:FREQuency v[units]	.2500 to 1000.0000	Sets Center Frequency . See Note 1.
:FREQuency?		Queries Center Frequency.
:INPut		
:ANTenna		Sets ANTENNA Connector as input.
:ATTenuation v	0 or 30	Sets input ATTenuation in dB.
:ATTenuation?		Queries input ATTenuation.
:TR		Sets T/R Connector as input.
:INPut?		Queries selected input connector.
:MARKer		
:AMPLitude?		Queries level at active marker location.
:FREQuency v[units]		Sets marker frequency. Range of value is dependent on scan width. Marker frequency must be in displayed frequency window. See Note 1.
:FREQuency?		Queries Marker Frequency.
:STATe b	0 or 1	Sets Marker to ON or OFF.
:STATe?		Queries Marker state.
:MODE	AVERage	Sets Mode to Average.
	COMPare	Sets Mode to Compare.
	LIVE	Sets Mode to LIVE.
	PEAKhold	Sets Mode to Peakhold.
	RECAll	Recalls stored trace.
	STORe	Stores current trace in memory.

ANALyzer		
:MODE?		Queries Mode Type.
:REFerence		
:LEVel v		Sets Reference Level. Range is dependent on Scale. Range is 0 to 2 in 10 dB mode. Range is 0 to 64 in 2 dB mode.
:LEVel?		Queries Reference Level.
:SCALe v	2 or 10	Sets Scale in dB.
:UNITs	DBM	Sets Scale Units to dBm.
	DBW	Sets Scale Units to dBW.
	DBMV	Sets Scale Units to dBmV.
	DBUV	Sets Scale Units to dBµV.
	DBUW	Sets Scale Units to dBµW.
	DBV	Sets Scale Units to dBV.
:UNITs?		Queries Units selected.
:SCALe?		Returns Scale value.
:SPAN v[units]	1, 2, 5, 10, 20, 50, 100, 200, 500 kHz, 1 MHz	Sets Spanwidth. Assumed units are kHz. Accepted units are KHZ and MHZ.
:SPAN?		Returns Spanwidth value and units.
:TRACe		
:DATA?[v1,v2,v3]		Queries current data trace values. v1 specifies Mode (0[live], 1[recall], 2[peakhold]). v2 specifies start point in pixels, with range of 0 to 499. v3 specifies number of returned points in pixels with range of 0 to 499, where v1 + v2 ≤500. Defaults are 0,0,500.
:TRACKgen b	0 or 1	Sets Tracking Generator to ON or OFF. Requires Option 12.
:LEVel v		Sets Tracking Generator level in dBm. Range is dependent on input connector. Range is -130 to -20 dBm if T/R connector is selected. Range is -130 to -13 dBm if AUX RF OUT Connector is selected.
:LEVel?		Queries Tracking Generator level.
:TRACKgen?		Queries Tracking Generator state.

BER COMMANDS

Refer to Measure Commands for initiating BER Meter operation and obtaining data.
Send SYST:KEY:STOP command to halt BER Meter operation.

BER		
:ALARm		
:STATe b	0 or 1	Sets Alarm to ON or OFF.
:STATe?		Queries Alarm status.
:BAUD v	75, 150 300, 600, 1200, 2400, 4800, 9600	Sets baud rate of data transfer.
:BAUD?		Queries baud rate for dat transfer.
:COUPling	AC or DC	Sets coupling for input signal.
:COUPling?		Queries Coupling status.
:FM		
:RANGe v[units]	10, 20, 50, 100	Sets Deviation Range in kHz.
:RANGe?		Queries Deviation Range.
:INPut	AUDIN	Sets Input to Audio Data In.
	DEMODulation	Sets input to demodulated signal.
:INPut?		Queries input setting.

BER		
:MODE		
:CONTinuous		Sets BER Meter to loop continuously.
:LOOP v	1 to 100000	Sets BER Meter to loop for specified number of tests.
:LOOP?		Queries number of loops for LOOP Mode.
:MODE?		Queries Mode type.
:OUTPut	AUDOUT	Sets output to AUDIO/DATA GEN Connector.
	GENerator	Sets output to RF Generator.
:OUTPut?		Queries output destination.
:PATTern	FIXed	Sets Data Pattern to Fixed.
	RANDom	Sets Data Pattern to Random.
:PATTern?		Queries Data Pattern type.
:PEAKhold		
:MAXimum?		Queries Maximum Peak Hold value.
:RESet		Resets Peak Hold function.
:STATe b	0 or 1	Sets Peak Hold to ON or OFF
:STATe?		Queries Peak Hold setting.
:POLarity	INVerted	Sets Data Polarity to Inverted.
	NORmal	Sets Data Polarity to Normal.
:POLarity?		Queries DAta Polarity.
:SIZE v	128 to 100000	Sets size of data word in bits.
:SIZE?		Queries data word size.
:UPPer v1,v2		Sets Upper Limit to value defined as v1 EXP v2. Range of v1 is 1 to 9999. Range of v2 is 1 to 9.
:STATe b	0 or 1	Sets Upper Limit to ON or OFF.
:STATe?		Queries Upper Limit state.
:UPPer?		Queries Upper Limit values.

DECODER COMMANDS

DECode		
:FORMat	EEA	Set DECode format for desired decode format.
	EIA	
	ZVEI	
	DZVei	
	DDZVei	
	CCIR	
	CCIRH	
	CCIRH4	
	NATel	
	EURo	
	TONE5_6	
	USER	
	DTMF	
	DCS	
	DCSINVerted	
	POCSag	
:POCSag		
:BAUD v	512, 1200	Sets POCSAG receive baud rate.
:BAUD?		Queries POCSAG receive baud rate.
:MESSage?		Queries ASCII decode string. DCS and DCSINV are returned in SCPI #Q Octal format.

DISPLAY COMMANDS

The DISPlay subsystem changes the screen. Fields on the current display are updated as they are changed. New screens are displayed with this command.

DISPlay?		Queries current screen number.
DISPlay		
:ANALyzer		Displays independent Spectrum Analyzer.
:BER		Displays BER Meter.
:DUPLex		
:GENerator		No parameter for GEN screen.
	DISTortion	Displays dependent Distortion Meter.
	AFLevel	Displays AF Level Meter.
	SINad	Displays dependent SINAD Meter.
	SCOPe	Displays dependent Oscilloscope.
	ANALyzer	Displays dependent Analyzer.
:RECeiver		Displays Duplex Receive Operation Screen when no parameter is used.
	LEVel	Displays dependent Received Level Meter.
	MODulation	Displays Modulation Meter.
	DISTortion	Displays dependent Distortion Meter.
	AFCounter	Displays dependent AF Counter.
	POWer	Displays RF Power Meter.
	SINad	Displays dependent SINAD Meter.
	SCOPe	Displays dependent Oscilloscope.
	ANALyzer	Displays dependent Spectrum Analyzer.
	RFERror	Displays RF Error Meter.
:RECGen		Displays Duplex Screen.
:FGENerator		Displays Audio/Data/Signal Generators
:GENerator		Displays RF Generate Operation Screen when no parameter is used.
	DISTortion	Displays dependent Distortion Meter.
	AFLevel	Displays AF Level Meter.
	SINad	Displays dependent SINAD Meter.
	SCOPe	Displays dependent Oscilloscope.
	ANALyzer	Displays dependent Analyzer.
:METers	DISTortion	Displays Independant Distortion Meter.
	SINad	Displays Independant SINAD Meter.
	AFCounter	Displays Independant AF Counter.
	DVM	Displays Independant DVM.
:RECeiver		Displays RF Receive Operation Screen when no parameter is used.
	LEVel	Displays dependent Received Level Meter.
	MODulation	Displays Modulation Meter.
	DISTortion	Displays dependent Distortion Meter.
	AFCounter	Displays dependent AF Counter.
	POWer	Displays RF Powe Meter.
	SINad	Displays dependent SINAD Meter.
	SCOPe	Displays dependent Oscilloscope.
	ANALyzer	Displays dependent Spectrum Analyzer.
	RFERror	Displays RF Error Meter.
:SCOPe		Displays independent Oscilloscope.
:SETup		Displays Setup Menu.
:TRUNKing	RADIOSimulation	Displays LTR Radio Simulator Screen.
	REPeater	Displays LTR Repeater Simulator Screen.
	AUXSetup	Displays LTR Auxiliary Setup Screen,

DUPLEX COMMANDS

DUPLex		
:LOCK b	0 or 1	Sets Offset Lock to OFF and ON.
:LOCK?		Queries Offset Lock state.
:OFFSet v[units]	.2500 to 1000.0000	Sets offset frequency. Assumed units are MHz. Valid units are Hz, kHz, MHz or GHz.
:RECAll v	0 to 49	Restores duplex screen values from specified storage location.
:STORe v	0 to 49	Stores current settings at specified location.
:LABel v,string	0 to 49	Attaches character string (0 to 8 characters) to specified storage location.
:LABel? v	0 to 49	Queries LABel for specified storage location.

FILTER COMMANDS

FILTer		
:SPEaker	OFF	Sets Speaker Operation to OFF.
:BANDwidth		
:CMESsage		Sets Filter to C-Message Weighted Filter.
:WIDE		Sets Filter to Wideband.
:AUDio		Sets Internal Modulation as Speaker source. Valid only on Generate and Receive Operation Screens.
:SPEaker?		Queries current Speaker setting.
:MODMeter		
:HPASs v[units]	0, 300, 4000	Sets Filter to specified value. Default units are Hz. Accepted units are Hz and kHz. Setting filter to 0 sets filter OFF.
:HPASs?		Queries Filter setting.
:BPASs	OFF	Sets Filter to OFF.
	CMESsage	Sets Filter to C-Message Weighted Filter.
:BPASs?		Queries Filter setting.
:LPASs v[units]	0, 300, 4000, 20000	Sets Filter to specified value. Default units are Hz. Accepted units are Hz and kHz. Setting filter to 0 sets filter OFF.
:LPASs?		Queries Filter setting.
:AFDecode		
:HPASs v[units]	0, 300, 4000	Sets Filter to specified value. Default units are Hz. Accepted units are Hz and kHz. Setting filter to 0 sets filter OFF.
:HPASs?		Queries Filter setting.
:BPASs	OFF	Sets Filter to OFF.
	CMESsage	Sets Filter to C-Message Weighted Filter.
:BPASs?		Queries Filter setting.
:LPASs v[units]	0, 300, 4000, 20000	Sets Filter to specified value. Default units are Hz. Accepted units are Hz and kHz. Setting filter to 0 sets filter OFF.
:LPASs?		Queries Filter setting.
:AFCounter		
:HPASs v[units]	0, 300, 4000	Sets Filter to specified value. Default units are Hz. Accepted units are Hz and kHz. Setting filter to 0 sets filter OFF.
:HPASs?		Queries Filter setting.
:BPASs	OFF	Sets Filter to OFF.
	CMESsage	Sets Filter to C-Message Weighted Filter.
:BPASs?		Queries Filter setting.
:LPASs v[units]	0, 300, 4000, 20000	Sets Filter to specified value. Default units are Hz. Accepted units are Hz and kHz. Setting filter to 0 sets filter OFF.

FILTer		
:AFCounter		
:LPASs?		Queries Filter setting.
:DATADecode		
:HPASs v[units]	0, 300, 4000	Sets Filter to specified value. Default units are Hz. Accepted units are Hz and kHz. Setting filter to 0 sets filter OFF.
:HPASs?		Queries Filter setting.
:BPASs	OFF	Sets Filter to OFF.
	CMESsage	Sets Filter to C-Message Weighted Filter.
:BPASs?		Queries Filter setting.
:LPASs v[units]	0, 300, 4000, 20000	Sets Filter to specified value. Default units are Hz. Accepted units are Hz and kHz. Setting filter to 0 sets filter OFF.
:LPASs?		Queries Filter setting.
:CLEar		Sets all filters to OFF. Does not affect speaker.

FORMAT COMMANDS

The format commands set data formats for transferring numeric information. The data format for response data may override the definition of FORMat.

EXAMPLE: Floating point requirements always override a non-base10 FORMat.

FORMat type	
ASCii	Returns all data (including integers and real numbers) as an ASCII representation. Numbers are returned in base 10.
BINary	Returns data encoded as numeric base 2, preceded by #B. Example: 15 is #B1111.
HEXadecimal	Returns data encoded as numeric base 16, preceded by #H. Example: 255 is #HFF.
INTeger	Returns ONLY block data encoded as 8 bit binary data with header and checksum.
OCTal	Returns data encoded as numeric base 8, preceded by #Q. Example: 255 is #Q377.

FUNCTION GENERATOR COMMANDS

FGENerator		
:ATTenuation b	0 or 1	Turning Attenuation on activates divide-by-100 attenuator.
:ATTenuation?		Queries Attenuation state.
:DATA		
:CODe v	#Q0 to #Q777	Sets octal Code Value for DCS/ (DCS Inverted).
:CODe?		Queries DCS/DCS Inverted octal Code Value.
:FORMat	DCS	Sets DATA Format to DCS.
	INVDCS	Sets DATA Format to DCS Inverted.
	POCSag	Sets DATA Format to POCSAG.
:FORMat?		Queries DATA Format.
:LEVel v		Sets output level for DATA Generator. Value is dependent on status of Attenuation. Value is .02 to 2.5 Vp if OFF and .0002 to .025 Vp if ON.
:LEVel?		Queries DATA Generator LEVel.
:POCSag		
:BAUD v	512, 1200, 2400	Selects Baud rate for POCSAG Generation.
:BAUD?		Queries POCSAG Baud rate.
:CAPCode v1[,v2]	0 to 9999999	Sets capcode range. v1 corresponds to start value and v2 corresponds to end value. Start value must be ≤ end value.

FGENerator		
:DATA		
:POCSag		
:CAPCode?		Queries current pocsag capcode.
:ENCOde		Activates POGSAG Generation.
:MODE	BEEP1	Sets POCSAG Mode to 1 Beep.
	BEEP2	Sets POCSAG Mode to 2 Beep.
	BEEP3	Sets POCSAG Mode to 3 Beep.
	BEEP4	Sets POCSAG Mode to 4 Beep.
	NUMeric	Sets POCSAG Mode to Numeric.
	NUMSeq	Sets POCSAG Mode to Numeric Sequence.
	ANUM	Sets POCSAG Mode to Alpha-Numeric.
	ANUM_UC	Sets POCSAG Mode to Alpha-Numeric upper case.
	ANUM_LC	Sets POCSAG Mode to Alpha-Numeric lower case.
	ANUM_SPec	Sets POCSAG Mode to Alpha-Numeric special characters.
:MODE?		Queries POCSAG Mode.
:STATe b	0 or 1	Sets DATA Generator to ON or OFF.
:STATe?		Queries DATA Generator status.
:DTMF		
:CODe v		Sets DTMF Code where v is code.
:CODe?		Queries DTMF Code.
:ENCode		Starts DTMF burst message.
:LEVel v		Sets output level for DTMF Generator. Value is dependent on status of Attenuation. Value is .02 to 2.5 Vp if OFF and .0002 to .025 Vp if ON.
:LEVel?		Queries DTMF Generator LEVel.
:MARK v		Sets Mark TIme in ms.
:MARK?		Queries Mark TIme.
:MODE	CONTinuous	Sets operation to continuous generation.
	BURSt	Sets operation to single burst.
:MODE?		Returns operation mode.
:PAUSe v	25 to 999	Sets Pause Time in ms.
:PAUSe?		Queries Pause Time.
:SPACe v	25 to 999	Sets Space Time in ms.
:SPACe?		Queries Space Time.
:STATe b	0 or 1	Sets DTMF Generator to ON or OFF.
:STATe?		Queries DTMF Generator status.
:GEN1		
:ENCode		Issues burst message of current format.
:FORMat		
:EEA string	0-9, A, G, R	Sets EEA Format with Code set to string.
:EIA string	0-9, A, G, R	Sets EIA Format with Code set to string.
:ZVEI string	0-9, A, G, R	Sets ZVEI Format with Code set to string.
:DZVei string	0-9, A, G, R	Sets DZVEI Format with Code set to string.
:DDZVei string	0-9, A, G, R	Sets DDZVEI Format with Code set to string.
:CCIR string	0-9, A, G, R	Sets CCIR Format with Code set to string.
:CCIRH string	0-9, A, G, R	Sets CCIRH Format with Code set to string.
:CCIRH4 string	0-9, A, G, R	Sets CCIRH4 Format with Code set to string.
:NATel string	0-9, A, G, R	Sets NATEL Format with Code set to string.
:EURo string	0-9, A, G, R	Sets EURO Format with Code set to string.
:TONE5_6 string	0-9, A, G, R	Sets 5/6 TONE Format with Code set to string.
:USER string	0-9, A-T	Sets USER Format with Code set to string.
:TONE10ps string	0-9, A-D, #, *	Sets 10 PS Format with Code set to string.
:TONE20ps string	0-9, A-D, #, *	Sets 10 PS Format with Code set to string.
:MTS string	0-9, A-D, #, *	Sets MTS Format with Code set to string.
:IMTS string	0-9, A-D, #, *	Sets IMTS Format with Code set to string.
:TREM		Sets Tone Remote Format.
:TONe		Sets Tone Format.
:FORMat?		Queries current GEN1 format.

:GEN1		
:FREQuency v		Sets GEN1 Frequency. Range of value is 5.0 to 20000.0 Hz for Sine Shape and Tone Format. 5.0 to 10000.0 Hz for other shapes and Tone Format. Selections for Tone remote are: 1950, 1850, 1350,1250, 2050, 1750, 1650,1550, 1450, 1150, or 1050 Hz.
:FREQuency?		Queries GEN1 frequency.
:LEVel v		Sets output level for Audio Generator 1. Value is dependent on status of Attenuation. Value is .02 to 2.5 Vp if OFF and .0002 to .025 Vp if ON.
:LEVel?		Queries Audio Generator 1 LEVel.
:MODE	CONTinuous	Sets mode for continous operation.
	BURSt	Initiates a burst of current format.
:MODE?		Queries mode.
:STATe b	0 or 1	Sets Audio Generator 1 to ON or OFF.
:STATe?		Queries Audio Generator 1 status.
:SHAPe	SINe	Sets Shape to Sine.
	SQUare	Sets Shape to Square.
	RAMP	Sets Shape to Ramp.
	TRIangle	Sets Shape to Triangle.
:SHAPe?		Queries Shape.
:TIMe v	0 to 32.000	Sets burst time for Tone format in seconds.
:TIMe?		Queries Tone burst time.
:USER "string",v1,v2		Sets User Codes. "string" is 0 to 9 or A to T enclosed in quotes. Code frequency (v1) is 5.0 to 20000.0 Hz. Duration (v2) is 0.000 to 99.999 Hz.
:USER? "string"		Returns frequency and duration of specified code.
:GEN2		
:FREQuency v		Sets GEN2 Frequency. Range of value is 5.0 to 20000.0 Hz for Sine Shape and 5.0 to 10000.0 Hz for other shapes. Requires Option 04 for frequency other than 1000.0 Hz.
:FREQuency?		Queries Frequency.
:LEVel v		Sets output level for Audio Generator 2. Value is dependent on status of Attenuation. Value is .02 to 2.5 Vp if OFF and .0002 to .025 Vp if ON.
:LEVel?		Queries Audio Generator 2 LEVel.
:SHAPe	SINe	Sets Shape to Sine.
	SQUare	Sets Shape to Square. Requires Option 04.
	RAMP	Sets Shape to Ramp. Requires Option 04.
	TRIangle	Sets Shape to Triangle. Requires Option 04.
:SHAPe?		Queries Shape.
:STATe b	0 or 1	Sets Audio Generator 2 to ON or OFF.
:STATe?		Queries Audio Generator 2 status.

GENERATOR COMMANDS

NOTE1: Set frequency to value. Assumed units are MHz. Valid optional units are Hz, kHz, MHz or GHz. Frequency range is from 0.2500 to 1000.0000 MHz.

NOTE2: Set output level in DBM, uV, mV or V. Assumed units are dBm. Ranges are as follows:

UNITS	T/R	AUX w/o 20dB AMP	AUX w/20dBm AMP
DBM	-130 to -20	-130 to -13	-130 to 13
uV	0 to 999.9	0 to 999.9	0 to 999.9
mV	0 to 22.3	0 to 50.5	0 to 999.9
V	0 to 0.022	0 to 0.050	0 to 0.988

NOTE3: Cannot have FM and PM modulation chosen on two different function generator devices.

NOTE4: Must set the "MODE" before using this command.

GENerator		
:FREQuency v[units]	0.2500 to 1000.0000	See NOTE 1.
:CELLular v	1 to 1023	Sets Cellular channel. See NOTE 4.
:CELLular?		Queries current Cellular channel.
:LIST v	0 to 99	Sets frequency list value. Refer to NOTE 4.
:FREQuency v1,v2[units]	0 to 99, 0.2500 to 1000.0000	Sets frequency list value (v1) to frequency (v2). See NOTE 1.
:FREQuency? v	0 to 99	Queries frequency of specified frequency list value.
:LABel v,string	0 to 99	Attaches character string (≤6 characters) to specified frequency list value.
:LABel? v	0 to 99	Queries LABel for specified frequency list value.
:LIST?		Queries frequency list value.
:MODE		
:CELLular	FORward	Sets cellular forward channel as MODE Type.
	REVerse	Sets cellular reverse channel as MODE Type.
:FIXed		Sets frequency as MODE Type.
:LIST		Sets Frequency LIST as MODE Type.
:TRUNKing	FORward	Sets trunking forward channel as MODE Type.
	REVerse	Sets trunking reverse channel as MODE Type.
:MODE?		Returns current MODE.
:TRUNKing v1,v2	1 to 760, 800 or 900	Sets Trunking Channel in specified band. See NOTE 4.
:TRUNKing?		Queries Trunking Channel.
:FREQuency?		Returns frequency in MHz.
:METer		
:ANALyzer		Sets Spectrum Analyzer on RF Generate Operation Screen.
:DISTortion		Sets Distortion Meter on RF Generate Operation Screen.
:SCOPe		Sets Oscilloscope on RF Generate Operation Screen.

GENerator		
:METer		
:SINad		Sets SINAD Meter on RF Generate Operation Screen.
:OUTPut		
:AUX		Sets AUX RF OUT Connector as output.
:DATA		
:AM		
[:MODulation]	0% to 100%	Sets AM Modulation Level.
[:MODulation]?		Queries AM Modulation Level.
:FM		
[:DEViation] v	0.0 to 100.0	Sets FM Deviation in kHz.
[:DEViation]?		Queries FM Deviation.
:MODulation	AM	Sets Modulation Type to AM.
	FMNarrow	Sets Modulation Type to FM Low. See NOTE 3.
	FMWide	Sets Modulation Type to FM High. See NOTE 3.
	OFF	Sets Modulation Type to OFF.
	PM	Sets Modulation Type to PM. See NOTE 3.
:MODulation?		Queries Modulation Type.
:PM		
[:DEViation] v	0.0 to 10.0	Sets PM Deviation in Radians.
: [:DEViation]?		Queries PM Deviation.
:DTMF		
:AM		
[:MODulation]	0% to 100%	Sets AM Modulation Level.
[:MODulation]?		Queries AM Modulation Level.
:FM		
[:DEViation] v	0.0 to 100.0	Sets FM Deviation in kHz.
[:DEViation]?		Queries FM Deviation.
:MODulation	AM	Sets Modulation Type to AM.
	FMNarrow	Sets Modulation Type to FM Low. See NOTE 3.
	FMWide	Sets Modulation Type to FM High. See NOTE 3.
	OFF	Sets Modulation Type to OFF.
	PM	Sets Modulation Type to PM. See NOTE 3.
:MODulation?		Queries Modulation Type.
:PM		
[:DEViation] v	0.0 to 10.0	Sets PM Deviation in Radians.
: [:DEViation]?		Queries PM Deviation.
:EXTernal		
:MODulation	AM	Sets Modulation Type to AM.
	FMNarrow	Sets Modulation Type to FM Low. See NOTE 3.
	FMWide	Sets Modulation Type to FM High. See NOTE 3.
	OFF	Sets Modulation Type to OFF.
	PM	Sets Modulation Type to PM. See NOTE 3.
:MODulation?		Queries Modulation Type.
:GATE	TR	Sets T/R Connector as output connector, as selected by MIC PTT switch.
	AUX	Sets AUX RF OUT Connector as output, as selected by MIC PTT switch.
:GEN1		
:AM		
[:MODulation]	0% to 100%	Sets AM Modulation Level.
[:MODulation]?		Queries AM Modulation Level.
:FM		
[:DEViation] v	0.0 to 100.0	Sets FM Deviation in kHz.
[:DEViation]?		Queries FM Deviation.
:MODulation	AM	Sets Modulation Type to AM.
	FMNarrow	Sets Modulation Type to FM Low. See NOTE 3.
	FMWide	Sets Modulation Type to FM High. See NOTE 3.
	OFF	Sets Modulation Type to OFF.
	PM	Sets Modulation Type to PM. See NOTE 3.

GENerator		
:OUTPut		
:MODulation?		Queries Modulation Type.
:PM		
[:DEViation] v	0.0 to 10.0	Sets PM Deviation in Radians.
: [:DEViation]?		Queries PM Deviation.
:GEN2		
:AM		
[:MODulation]	0% to 100%	Sets AM Modulation Level.
[:MODulation]?		Queries AM Modulation Level.
:FM		
[:DEViation] v	0.0 to 100.0	Sets FM Deviation in kHz.
[:DEViation]?		Queries FM Deviation.
:MODulation	AM	Sets Modulation Type to AM.
	FMNarrow	Sets Modulation Type to FM Low. See NOTE 3.
	FMWide	Sets Modulation Type to FM High. See NOTE 3.
	OFF	Sets Modulation Type to OFF.
	PM	Sets Modulation Type to PM. See NOTE 3.
:MODulation?		Queries Modulation Type.
:PM		
[:DEViation] v	0.0 to 10.0	Sets PM Deviation in Radians.
: [:DEViation]?		Queries PM Deviation.
:LEVel v[units]		Sets Output level. See NOTE 2.
:LEVel?		Queries Output level.
:LEVel		
:UNITs	DBM	Sets UNITS for LEVel? command to dBm.
	UV	Sets UNITS for LEVel? command to µV.
	MV	Sets UNITS for LEVel? command to mV.
	V	Sets UNITS for LEVel? command to V.
:UNITs?		Queries UNITS Type.
:MIC		
:MODulation	AM	Sets Modulation Type to AM.
	FMNarrow	Sets Modulation Type to FM Low. See NOTE 3.
	FMWide	Sets Modulation Type to FM High. See NOTE 3.
	OFF	Sets Modulation Type to OFF.
	PM	Sets Modulation Type to PM. See NOTE 3.
:MODulation?		Queries Modulation Type.
:TR		Sets T/R Connector as output connector.
:OUTPut?		Queries selected output port.
:RECAll v	0 to 49	Restore GENERATE Screen values from specified location.
:STORe v	0 to 49	Stores current screen locations at specified location.
:LABel v,string	0 to 49	Attaches character string (0 to 8 characters) to specified storage location.
:LABel? v	0 to 49	Queries LABel for storage location.
:SWEep		
:ABORt		Stops Sweep Function.
:CONTinuous		Sets Sweep Function to Continuous Operation. Use ABORt to halt.
:INCRement v	0.0001 to 1000,0000	Sets Increment Frequency in MHz.
:INCRement?		Queries Increment Frequency.
:PAUSe v	0.0 to 9.5	Sets Pause time for Sweep Function in seconds.
:PAUSe?		Queries Pause time for Sweep Function.
:ONCE		Sets Sweep Function for one pass. Use ABORt after pass.
:STARt v	0.2500 to 1000.0000	Sets Start RF in MHz.
:STARt?		Queries Start RF.
:STOP v	0.2500 to 1000.0000	Sets Stop RF in MHz.
:STOP?		Queries Stop RF.

METer		
:PM		
[:DEViation]		
:AVERage		
:STATe?		Queries Average state.
:LOWer v	0.0 to 10.0	Sets Lower Limit values in Radians.
:STATe b	0 or 1	Sets Lower Limit to ON or OFF.
:STATe?		Queries Lower Limit state.
:LOWer?		Queries Lower Limit value.
:PEAKhold		
:MINimum?		Queries minimum peak value.
:MAXimum?		Queries maximum peak value.
:RESet		Resets Peak Hold setting.
:STATe b	0 or 1	Sets Peak Hold to ON or OFF.
:STATe?		Queries Peak Hold setting.
:RANGe v[units]	1, 2, 5, 10	Sets display range in Radians.
:AUTO		Sets display range to autorange.
:RANGe?		Queries Range.
:UPPer v	0.0 to 10.0	Sets Upper Limit value in Radians.
:STATe b	0 or 1	Sets Upper Limit to ON or OFF.
:STATe?		Queries Upper Limit state.
:UPPer?		Queries Upper Limit value.
:AM		
:ALARm		
:STATe b	0 or 1	Sets Alarm to ON or OFF.
:STATe?		Queries Alarm state.
:AVERage		
:COUNt v	2 to 10	Sets number of Average samples when active.
:COUNt?		Queries number of Average samples.
:STATeb	0 or 1	Sets Average to ON or OFF.
:STATe?		Queries Average state.
:LOWer v	0.0% to 100.0%	Sets Lower Limit values.
:STATe b	0 or 1	Sets Lower Limit to ON or OFF.
:STATe?		Queries Lower Limit state.
:LOWer?		Queries Lower Limit value.
:PEAKhold		
:MINimum?		Queries minimum peak value.
:MAXimum?		Queries maximum peak value.
:RESet		Resets Peak Hold setting.
:STATe b	0 or 1	Sets Peak Hold to ON or OFF.
:STATe?		Queries Peak Hold setting.
:RANGe v[units]	40% or 100%	Sets display range.
:AUTO		Sets display range to autorange.
:RANGe?		Queries Range.
:UPPer v	0.0% to 100.0%	Sets Upper Limit value.
:STATe b	0 or 1	Sets Upper Limit to ON or OFF.
:STATe?		Queries Upper Limit state.
:UPPer?		Queries Upper Limit value.
:RECLevel		
:ADJust		Performs runtime adjustment. Requires external connection between ANTENNA Connector and T/R Connector for valid adjustment.
:ALARm		
:STATe b	0 or 1	Sets Alarm to ON or OFF.
:STATe?		Queries Alarm state.
:AVERage		
:COUNt v	2 to 10	Sets number of Average samples when active.
:COUNt?		Queries number of Average samples.
:STATeb	0 or 1	Sets Average to ON or OFF.
:STATe?		Queries Average state.

METer		
:RECLevel		
:LOWer v		Sets Lower Limit values. Range of value is dependent on Receiver Attenuation and Units. If REC:INP:ATT is set to 30 dB, range is -80 to 0 dBm or 22.3 to 223606 µV. If REC:INP:ATT is set to 0 dB, range is -110 to -30 dBm or 0 to 70710 µV.
:STATe b	0 or 1	Sets Lower Limit to ON or OFF.
:STATe?		Queries Lower Limit state.
:LOWer?		Queries Lower Limit value.
:PEAKhold		
:MINimum?		Queries minimum peak value.
:MAXimum?		Queries maximum peak value.
:RESet		Resets Peak Hold setting.
:STATe b	0 or 1	Sets Peak Hold to ON or OFF.
:STATe?		Queries Peak Hold setting.
:RANGe v[units]	40% or 100%	Sets display range.
:AUTO		Sets display range to autorange.
:RANGe?		Queries Range.
:UNITs	DBM	Sets units for meter to dBm.
	UV	Sets units for meter to µV.
:UNITs?		Return the units.
:UPPer v		Sets Upper Limit values. Range of value is dependent on Receiver Attenuation and Units. If REC:INP:ATT is set to 30 dB, range is -80 to 0 dBm or 22.3 to 223606 µV. If REC:INP:ATT is set to 0 dB, range is -110 to -30 dBm or 0 to 70710 µV.
:STATe b	0 or 1	Sets Upper Limit to ON or OFF.
:STATe?		Queries Upper Limit state.
:UPPer?		Queries Upper Limit value.
:AFCounter		
:ALARm		
:STATe b	0 or 1	Sets Alarm to ON or OFF.
:STATe?		Queries Alarm state.
:AVERage		
:COUNt v	2 to 10	Sets number of Average samples when active.
:COUNt?		Queries number of Average samples.
:STATeb	0 or 1	Sets Average to ON or OFF.
:STATe?		Queries Average state.
GATE		
TIME v	1 or 10	Sets Gate Time in seconds.
TIME?		Queries Gate Time.
:INPut	AUDIN	Sets AF Counter Input to AUDIO/DATA IN Connector.
	RFPower	Sets AF Counter Input to RF Power line.
	EXTMod	Sets AF Counter Input to EXT MOD Connector.
	SCOPedvm	Sets AF Counter Input to SCOPE/DVM Connector.
:INPut?		Queries meter Input.
:LOWer v	0.0 to 20000.0	Sets Lower Limit values in Hz.
:STATe b	0 or 1	Sets Lower Limit to ON or OFF.
:STATe?		Queries Lower Limit state.
:LOWer?		Queries Lower Limit value.
:PEAKhold		
:MINimum?		Queries minimum peak value.
:MAXimum?		Queries maximum peak value.
:RESet		Resets Peak Hold setting.
:STATe b	0 or 1	Sets Peak Hold to ON or OFF.
:STATe?		Queries Peak Hold setting.

METer		
:AFCounter		
:RANGe v[units]	20, 200, 2000, 20000	Sets display range. Assumed units are Hz, allowed units are Hz and kHz.
:AUTO		Sets display range to autorange.
:RANGe?		Queries Range.
:UPPer v	0.0 to 20000.0	Sets Upper Limit value in Hz.
:STATe b	0 or 1	Sets Upper Limit to ON or OFF.
:STATe?		Queries Upper Limit state.
:UPPer?		Queries Upper Limit value.
:AFLevel		
:ALARm		
:STATe b	0 or 1	Sets Alarm to ON or OFF.
:STATe?		Queries Alarm state.
:AVERage		
:COUNt v	2 to 10	Sets number of Average samples when active.
:COUNt?		Queries number of Average samples.
:STATeb	0 or 1	Sets Average to ON or OFF.
:STATe?		Queries Average state.
:IMPedance v	2 to 999	Specify input impedance of user signal.
:IMPedance?		Queries impedance.
:LOWer v	0.00 to 10.00	Sets Lower Limit values in V.
:STATe b	0 or 1	Sets Lower Limit to ON or OFF.
:STATe?		Queries Lower Limit state.
:LOWer?		Queries Lower Limit value.
:PEAKhold		
:MINimum?		Queries minimum peak value.
:MAXimum?		Queries maximum peak value.
:RESet		Resets Peak Hold setting.
:STATe b	0 or 1	Sets Peak Hold to ON or OFF.
:STATe?		Queries Peak Hold setting.
:RANGe v[units]	.05, .1, .2, .5, 1, 2, 5, 10	Sets display range. Assumed units are V, allowed units are mV and V.
:AUTO		Sets display range to autorange.
:RANGe?		Queries Range.
:UNITs	DBM	Sets units for meter to dBm.
	VRMS	Sets units for meter to Vrms.
	DB	Sets units for meter to dB.
:UNITs?		Queries units setting.
:UPPer v	0.00 to 10.00	Sets Upper Limit value in V.
:STATe b	0 or 1	Sets Upper Limit to ON or OFF.
:STATe?		Queries Upper Limit state.
:UPPer?		Queries Upper Limit value.
:POWer		
:ADJust		Zeroes Power Meter. Requires Power applied to T/R Connector be removed.
:ALARm		
:STATe b	0 or 1	Sets Alarm to ON or OFF.
:STATe?		Queries Alarm state.
:AVERage		
:COUNt v	2 to 10	Sets number of Average samples when active.
:COUNt?		Queries number of Average samples.
:STATeb	0 or 1	Sets Average to ON or OFF.
:STATe?		Queries Average state.
:LOSS v	-9.9 to 9.9	Sets Cable Loss in dB.
:LOSS?		Queries Cable Loss value.
:LOWer v	0.0000 to 200.0000	Sets Lower Limit values in W.
:STATe b	0 or 1	Sets Lower Limit to ON or OFF.
:STATe?		Queries Lower Limit state.
:LOWer?		Queries Lower Limit value.

METer		
:POWer		
:PEAKhold		
:MINimum?		Queries minimum peak value.
:MAXimum?		Queries maximum peak value.
:RESet		Resets Peak Hold setting.
:STATe b	0 or 1	Sets Peak Hold to ON or OFF.
:STATe?		Queries Peak Hold setting.
:RANGe v[units]	.002, .005, .01, .02, .05, .1, .2, .5, 1, 2, 5, 10, 20, 50, 100,200	Sets display range. Assumed units are W, allowed units are mW and W.
:AUTO		Sets display range to autorange.
:RANGe?		Queries Range.
:UNITs	DBM	Sets units for meter to dBm.
	W	Sets units for meter to W.
:UNITs?		Queries units setting.
:UPPer v	0.0000 to 200.0000	Sets Upper Limit value in W.
:STATe b	0 or 1	Sets Upper Limit to ON or OFF.
:STATe?		Queries Upper Limit state.
:UPPer?		Queries Upper Limit value.
:DVM		
:ALARm		
:STATe b	0 or 1	Sets Alarm to ON or OFF.
:STATe?		Queries Alarm state.
:AVERage		
:COUNt v	2 to 10	Sets number of Average samples when active.
:COUNt?		Queries number of Average samples.
:STATeb	0 or 1	Sets Average to ON or OFF.
:STATe?		Queries Average state.
:IMPedance v	2 to 999	Specifies input impedance of user signal.
:IMPedance?		Queries impedance.
:INPut	AC	Sets meter input to ac coupled SCOPE/DVM Connector.
	AUDIN	Sets meter input to AUDIO/DATA IN Connector.
	DC	Sets meter input to dc coupled SCOPE/DVM Connector.
	EXTMod	Sets meter input to EXT MOD Connector.
	GROund	Sets meter input to GND coupled SCOPE/DVM Connector.
:LOWer v	0.000 to 200.000	Sets Lower Limit values in V.
:STATe b	0 or 1	Sets Lower Limit to ON or OFF.
:STATe?		Queries Lower Limit state.
:LOWer?		Queries Lower Limit value.
:PEAKhold		
:MINimum?		Queries minimum peak value.
:MAXimum?		Queries maximum peak value.
:RESet		Resets Peak Hold setting.
:STATe b	0 or 1	Sets Peak Hold to ON or OFF.
:STATe?		Queries Peak Hold setting.
:RANGe v[units]	.05, .1, .2, .5, 1, 2, 5, 10, 20, 50, 100	Sets display range. Assumed units are V, allowed units are mV and V.
:AUTO		Sets display range to autorange.
:RANGe?		Queries Range.
:UNITs	DBM	Sets units for meter to dBm.
	VRMS	Sets units for meter to Vrms.
	DB	Sets units for meter to dB.
:UNITs?		Queries units setting.
:UPPer v	0.000 to 200.000	Sets Upper Limit value in V.
:STATe b	0 or 1	Sets Upper Limit to ON or OFF.
:STATe?		Queries Upper Limit state.
:UPPer?		Queries Upper Limit value.

METer		
:DISTortion		
:ALARm		
:STATe b	0 or 1	Sets Alarm to ON or OFF.
:STATe?		Queries Alarm state.
:AVERage		
:COUNt v	2 to 10	Sets number of Average samples when active.
:COUNt?		Queries number of Average samples.
:STATeb	0 or 1	Sets Average to ON or OFF.
:STATe?		Queries Average state.
:INPut	AUDIN	Sets meter input to AUDIO/DATA IN Connector.
	SCOPedvm	Sets meter input to SCOPE/DVM Connector.
:LOWer v	0.0% to 20.0%	Sets Lower Limit values.
:STATe b	0 or 1	Sets Lower Limit to ON or OFF.
:STATe?		Queries Lower Limit state.
:LOWer?		Queries Lower Limit value.
:PEAKhold		
:MINimum?		Queries minimum peak value.
:MAXimum?		Queries maximum peak value.
:RESet		Resets Peak Hold setting.
:STATe b	0 or 1	Sets Peak Hold to ON or OFF.
:STATe?		Queries Peak Hold setting.
:UPPer v	0.0% to 20.0%	Sets Upper Limit value.
:STATe b	0 or 1	Sets Upper Limit to ON or OFF.
:STATe?		Queries Upper Limit state.
:UPPer?		Queries Upper Limit value.
:RFERror		
:ALARm		
:STATe b	0 or 1	Sets Alarm to ON or OFF.
:STATe?		Queries Alarm state.
:AVERage		
:COUNt v	2 to 10	Sets number of Average samples when active.
:COUNt?		Queries number of Average samples.
:STATeb	0 or 1	Sets Average to ON or OFF.
:STATe?		Queries Average state.
GATE		
TIME v	0.1 or 1.0 .	Sets Gate Time in seconds.
TIME?		Queries Gate Time.
:PEAKhold		
:MINimum?		Queries minimum peak value.
:MAXimum?		Queries maximum peak value.
:RESet		Resets Peak Hold setting.
:STATe b	0 or 1	Sets Peak Hold to ON or OFF.
:STATe?		Queries Peak Hold setting.
:RANGe v[units]	.1, 1, 10, 100	Sets display range. Assumed units are kHz, allowed units are Hz and kHz.
:AUTO		Sets display range to autorange.
:RANGe?		Queries Range.
:UPPer v	0.0 to 100000.0	Sets Upper Limit value in Hz.
:STATe b	0 or 1	Sets Upper Limit to ON or OFF.
:STATe?		Queries Upper Limit state.
:UPPer?		Queries Upper Limit value.

RECEIVER COMMANDS

NOTE1: Set frequency to value. Assumed units are MHz. Valid optional units are Hz, kHz, MHz or GHz. Accepted frequency range is from 0.2500 through 1000.0000 MHz in 0.1 kHz steps.

NOTE2: Must set the "MODE" before using this command.

RECeiver		
:BANDwidth v[units]	3, 15, 30, 300	Sets Receiver IF Bandwidth in kHz. 3 kHz requires Option 8. 30 kHz requires Option 3.
:BANDwidth?		Queries IF Bandwidth.
:DEMODulation	AM	Sets Demodulation to AM.
	FM	Sets Demodulation to FM.
	LB	Sets Demodulation to Lower SSB. Requires Option 8.
	PM	Sets Demodulation to PM.
	UB	Sets Demodulation to Upper SSB. Requires Option 8.
:DEMODulation?		Queries Demodulation type.
:FREQuency v[units]	0.2500 to 1000.0000	See NOTE 1.
:CELLular v	1 to 1023	Sets Cellular channel. See NOTE 2.
:CELLular?		Queries current Cellular channel.
:LIST v	0 to 99	Sets frequency list value. See NOTE 2.
:FREQuency v1,v2[units]	0 to 99, 0.2500 to 1000.0000	Sets frequency list value (v1) to frequency (v2). See NOTE 1.
:FREQuency? v	0 to 99	Queries frequency of specified frequency list value.
:LABel v,string	0 to 99	Attaches character string (≤6 characters) to specified frequency list value.
:LABel? v	0 to 99	Queries LABel for specified frequency list value.
:LIST?		Queries frequency list value.
:MODE		
:CELLular	FORward	Sets cellular forward channel as MODE Type.
	REVerse	Sets cellular reverse channel as MODE Type.
:FIXed		Sets frequency as MODE Type.
:LIST		Sets Frequency LIST as MODE Type.
:TRUNKing	FORward	Sets trunking forward channel as MODE Type.
	REVerse	Sets trunking reverse channel as MODE Type.
:MODE?		Returns current MODE.
:TRUNKing v1,v2	1 to 760, 800 or 900	Sets Trunking Channel in specified band. See NOTE 2.
:TRUNKing?		Queries Trunking Channel.
:FREQuency?		Returns frequency in MHz.
:INPut		
:ANTenna		Selects Antenna input connector.
:ATTenuation v	0, 30	Sets input ATTenuation in dB.
:ATTenuation?		Returns input ATTenuation in dB.
:TR		Selects TR input connector.
:INPut?		Returns selected input connector.
[:METer]		
:ANALyzer		Sets Spectrum Analyzer on RF Receive Operation Screen.
:DEViation		Sets appropriate Modulation/Deviation Meter on RF Receive Operation Screen.
:DISTortion		Sets Distortion Meter on RF Receive Operation Screen.
:MODulation		Sets appropriate Modulation/Deviation Meter on RF Receive Operation Screen.

RECeiver		
[:METer]		
:SCOPe		Sets Oscilloscope on RF Receive Operation Screen.
:SINad		Sets SINAD Meter on RF Receive Operation Screen.
:OUTPut		
:DEMODulation xxx	AFCounter	Sets DEMOD out routing to AFCounter.
	AFDecode	Sets DEMOD out routing to AF Decoder.
	CMESsage	Sets DEMOD out routing to C-Weighted filter.
	DETectout	Sets DEMOD out routing to RF Detector output.
	DATADecode	Sets DEMOD out routing to Data Decoder.
	MODMeter	Sets DEMOD out routing to Modulation/Meter.
:DEMODulation?		Queries DEMOD out routing.
:RECAll v	0 to 49	Restore RECEIVE screen values from specified location.
:SCAN		
:ABORt		Stops Scan function.
:CONTinuous		Sets Scan Function to Continuous Operation. Use ABORt to halt.
:DELay v	0.0 to 9.5	Sets Delay Time for Scan function in seconds.
:DELay?		Queries Delay Time for Scan function.
:INCRement v	1 to 99	Sets Increment value for Scan.
:INCRement?		Queries Scan increment value.
:LIST?		Queries current frequency list/channel number.
:PAUSe v	0.0 to 9.5	Sets Pause Time for Scan function in seconds.
:PAUSe?		Queries Pause TIme for Scan function.
:ONCE		Sets Scan Function for one pass. Use ABORt after finished.
:RESUme		Continue Scan function where stopped or continue scanning if in squelch mode.
:STARt v		Sets Start frequency list/channel number. Range for v is 0 to 99 for Frequency List, 1 to 1023 for Cellular and 0 to 760 for Trunking.
:STARt?		Queries Start frequency list/channel number.
:STOP v		Sets Stop freq list/chan number. Range for v is 0 to 99 for Frequency List, 1 to 1023 for Cellular and 0 to 760 for Trunking.
:STOP?		Queries Stop frequency list/channel number.
:SCAN?		Queries whether Scan function is active.
:SQUelch		
:LEVel v	0 to 255	Sets squelch value. 0 is lowest squelch level.
:LEVel?		Queries squelch level.
:STATe?		Queries Squelch status. Returns 0 if squelched.
:STORe v	0 to 49	Stores current screen settings at stated location.
:LABel v,string	0 to 49	Attaches character string (0 to 8 characters) to specified storage location.
:LABel? v	0 to 49	Queries LABel for storage location.
:SWEep		
:ABORt		Stops Sweep Function.
:CONTinuous		Sets Sweep Function to Continuous Operation. Use ABORt to halt.
:DELay v	0.0 to 9.5	Sets Delay time for Sweep Function in seconds.
:DELay?		Queries Delay time.
:INCRement v	0.0001 to 1000,0000	Sets Increment Frequency in MHz.
:INCRement?		Queries Increment Frequency.
:PAUSe v	0.0 to 9.5	Sets Pause time for Sweep Function in seconds.
:PAUSe?		Queries Pause time for Sweep Function

RECeiver		
:SWEep		
:ONCE		Sets Sweep Function for one pass. Use ABORt after pass.
:STARt v	0.2500 to 1000.0000	Sets Start RF in MHz.
:STARt?		Queries Start RF.
:STOP v	0.2500 to 1000.0000	Sets Stop RF in MHz.
:STOP?		Queries Stop RF.
:RESUme		Continues sweeping where stopped or continue sweeping if in squelch mode.
:FREQuency?		Returns current Sweep Function frequency in MHz
:SWEep?		Queries Sweep Function Status. Returns 0 if off.
:VOLume v	0 to 255	Sets volume level. 0 is lowest value.
:VOLume?		Queries volume setting.

SCOPE COMMANDS

SCOPe		
:INPut	DC	Sets Input to dc coupled SCOPE/DVM Connector.
	AC	Sets Input to dc coupled SCOPE/DVM Connector.
	GROund	Sets Input to dc coupled SCOPE/DVM Connector.
	EXTMOD	Sets input to EXT MOD Connector. Valid in Generate Mode only.
	AUDIN	Sets AUDIO/DATA IN Connector as input. Valid in Generate Mode only.
	AUDOUT	Sets AUDIO/DATA GEN Connector as input.
	INTMOD	Sets internal modulation as Input. Valid in Generate Mode only.
	NOTCh	Sets Notch Residual as Input. Not valid with Independent Oscilloscope.
	AFCounter	Sets AF Counter line as input. Valid in Receive Mode only.
	AFDecode	Sets AF Decode/Sinad line as input. Valid in Receive Mode only.
	DATADecode	Sets DATA Decoder line as input. Valid in Receive Mode only.
	RFPower	Sets RF Power line as input. Valid in Receive Mode only.
	DETEctout	Sets Detector Out line as input. Valid in Receive Mode only.
	DEMODout	Sets DEMOD Connector as input. Valid in Receive Mode only.
	MODMeter	Sets Mod Meters as input. Valid in Receive Mode only.
:INPut?		Queries Input setting. Mode returned refers to Independent Oscilloscope. Returned modes are AC, DC or GND.
:VERTical v	0 to 255	Sets screen vertical offset in pixels.
:VERTical?		Queries Vertical offset.
:HORizontal v	-10 to 10	Sets horizontal offset in major divisions.
:HORizontal?		Queries offset.
:MARKer		
:STATe b	0 or 1	Sets Marker to ON or OFF.
:STATe?		Queries status of marker.
:TIMe v		Sets Marker Placement in time. Value is dependent on Sweep setting and Horizontal offset. Marker must be placed in visible screen
:TIMe?		Queries current Marker location.

SCOPe		
:MODE	AVERage	Sets Mode to Average.
	COMPare	Sets Mode to Compare.
	LIVE	Sets Mode to LIVE.
	RECAll	Recalls stored trace.
	STORe	Stores current trace in memory.
:MODE?		Queries Mode Type.
:SCALe v[units]		Sets Vertical Scale. Default units are V. Valid units are V and mV. Values include; 10, 20, 50, 100, 200, 500 mV, 1, 2, 5, 10, 20 and 50 V.
:SCALe?		Returns vertical scale with units.
:SWEep[:TIME] v[units]		Sets duration of sweep per division. Assumed units are ms. Valid units are µs (US) and ms (MS). Accepted values are 100, 200, 500 µs, 1, 2, 5, 10, 20, 50 and 100 ms.
:SWEep[:TIME]?		Returns SWEep setting with units.
:TRACe		
:DATA?[v1,v2,v3]		Queries current data trace values. v1 specifies Mode (0[live], 1[recall]). v2 specifies start point in pixels, with range of 0 to 499. v3 specifies number of returned points in pixels with range of 0 to 499, where v1 + v2 ≤500. Defaults are 0,0,500.
:TRIGger		
:ARM		Arms Trigger for Singleshot Mode.
:LEVel v	0 to 255	Sets trigger level.
:LEVel?		Queries trigger level.
:MODE	AUTO	Sets Trigger Mode to automatic.
	SINGleshot	Sets Trigger Mode to Singleshot.
NORMal		Sets Trigger Mode to Normaiized.
:MODE?		Queries Trigger Mode setting.

STATUS COMMANDS

NOTE: See Figure 5-1 for Status Bit definitions and SCPI manuals for further descriptions.

STATus	
:OPERation	
:CONDition?	Returns operation condition register.
:ENABle v	Sets enable mask in event register.
:ENABle?	Returns state of event register's enable bit.
:EVENt?	Returns, then clears operation's event register.
:INSTrument	
:CONDition?	Queries Operation complete status-1.
:EBIT	Sets extension bits.
:CONDition?	Returns operation complete status-2.
:ENABle v	Sets enable mask in INST EBIT EVENt register.
:ENABle?	Queries enable mask in INST EBIT EVENt register.
:EVENt?	Queries INSTrument EBIT EVENt register.
:ENABle v	Sets enable mask in INSTrument EVENt register.
:ENABle?	Queries enable mask in INSTrument EVENt register.
:EVENt?	Queries INSTrument EVENt register.
:MEASuring	
:CONDition?	Returns operation measuring status-1.
:EBIT	
:CONDition?	Returns operation measuring status-2.
:ENABle v	Set enable mask in MEAS EBIT EVENt register.

```
STATus
   :OPERation
      :MEASuring
            :ENABle?                    Queries enable mask in MEAS EBIT EVENt
                                          register.
            :EVENt?                     Queries MEAS EBIT EVENt register.
         :ENABle v                      Sets enable mask in MEAS EVENt register.
         :ENABle?                       Queries enable mask in MEAS EVENt register.
         :EVENt?                        Queries MEAS EVENt register.
   :PRESet                              Initializes enable and transition filter registers
                                          for SCPI mandated data structures.

   :QUEStionable
      :CONDition?                       Queries QUEST CONDition register.
      :ENABle v                         Sets enable mask in QUES EVENt register.
      :ENABle?                          Queries enable mask in QUES EVENt register.
      :EVENt?                           Queries QUEST EVENt register.
      :INSTrument
         :CONDition?                    Returns questionable status-1.
         :EBIT
            :CONDition?                 Returns questionable status-2.
            :ENABle v                   Sets enable mask in QUES INST EBIT EVENt
                                          register.
            :ENABle?                    Queries enable mask in QUES INST EBIT EVENt
                                          register.
            :EVENt?                     Queries QUES INST EBIT EVENt register.
         :ENABle v                      Sets enable mask in QUES INST EVENt register.
         :ENABle?                       Queries enable mask in QUES INST EVENt
                                          register.
         :EVENt?                        Queries QUES INST EVENt register.
```

SYSTEM COMMANDS

```
SYSTem
   :ERRor?                              Returns error code + error message.
                                          Refer to para 5-5 for codes/messages.
   :VERSion?                            Returns version of SCPI used.
   :KEY v                               Sends keycode to execute.
                                          Refer to para 5-6 for definitions.
      :STARt                            Sends start key.
      :STOP                             Sends stop key.
   :KEY?                                Returns key pressed or -1 if none.
   :KLOCk b                0 = off, 1 = on   OFF enables front panel keyboard usage.
                                          SYST:SEC OFF must be sent before setting
                                          this command to OFF. ON disables front
                                          panel keyboard.
   :KLOCk?                              Returns keyboard lock state.
   :COMMunication
      :SERial
         :BAUD v            110, 150, 300, 600,   Sets Baud rate.
                            1200, 2400, 4800,
                            9600, 19200, 38400
         :PARity xxx        EVEN, ODD, NONE       Sets Data Parity.
         :BITS v            7 or 8                Sets Data Bits.
         :SBITs v           1 or 2                Sets Stop Bits.
         :PACE              XON, NONE             Sets XON/XOFF handshake control.
         :CONTrol:
            RTS xxx         ON, STANdard, RFR     Sets hardware handshake control.
      :ECHO b               0 = off, 1 = on       Sets RCI ECHO on/off.
      :ECHO?                                      Returns RCI ECHO state.
```

SYSTem		
:GPIB		
:ADDRess v	1 to 30	Sets GPIB Address.
:DATE v,v,v		Sets numeric year, month and day.
:DATE?		Query numeric year, month and day.
:TIME v,v,v		Sets numeric hour, minute and second.
:TIME?		Query numeric hour, minute and second.
:SECurity		Refer to SCPI Volume 1 manual.
[:STATe] b	0 = off, 1 = on	Sets SECurity STATe.
[:STATe]?		
:SECurity?		

TRUNKING COMMANDS

These commands require Option 14, CLEARCHANNEL LTR® be installed.

TRUNKing		
:BORDer v	0 or 1	Sets Border Offset value.
:BORDer?		Queries Border Offset value.
:FREEChan v	1 to 760	Sets Free Repeater channel number.
:FREEChan?		Queries Free Repeater channel number.
:RADIOSimulation		
:CHANnel v	1 to 760	Sets Channel Number for testing.
:CHANnel?		Queries Channel Number.
:BAND	800 or 900	Sets Bandwidth in MHz.
:BAND?		Queries Bandwidth.
:AREA b	0 or 1	Sets Area Bit ON or OFF.
:AREA?		Queries Area Bit setting.
:INUSe v	0 to 31	Sets Inuse Number.
:INUSe?		Queries Inuse Number.
:HOME v	0 to 31	Sets Home Repeater Number
:HOME?		Queries Home Repeater Number.
:GROUP v	0 to 255	Sets Group Number.
:GROUP?		Queries Group Number.
:FREE v	0 to 31	Sets Free Repeater Number.
:FREE?		Queries Free Repeater Number.
:ENCode		Starts Test.
:REPeater		
:MODE	FREE	Sets Mode to Free Home Repeater.
	BUSY	Sets Mode to Busy Home Repeater.
:MODE?		Queries simulation mode type.
:CHANnel v	1 to 760	Sets Channel Number for testing.
:CHANnel?		Queries Channel Number.
:BAND	800 or 900	Sets Bandwidth in MHz.
:BAND?		Queries Bandwidth.
:AREA b	0 or 1	Sets Area Bit ON or OFF.
:AREA?		Queries Area Bit setting.
:GOTO v	0 to 31	Sets Goto Number.
:GOTO?		Queries Goto Number.
:HOME v	0 to 31	Sets Home Repeater Number
:HOME?		Queries Home Repeater Number.
:GROUP v	0 to 255	Sets Group Number.
:GROUP?		Queries Group Number.
:FREE v	0 to 31	Sets Free Repeater Number.
:FREE?		Queries Free Repeater Number.
:ENCode		Starts Test.
:HOME v		Repeater # for HOME slot in PTT
:RICGroup v	1 to 250	Sets Radio RIC ID.
:RICGroup?		Queries Radio RIC ID.
:SYNC v	#H0 TO #H1FF	Sets System Sync value.
:SYNC?		Queries System Sync value.

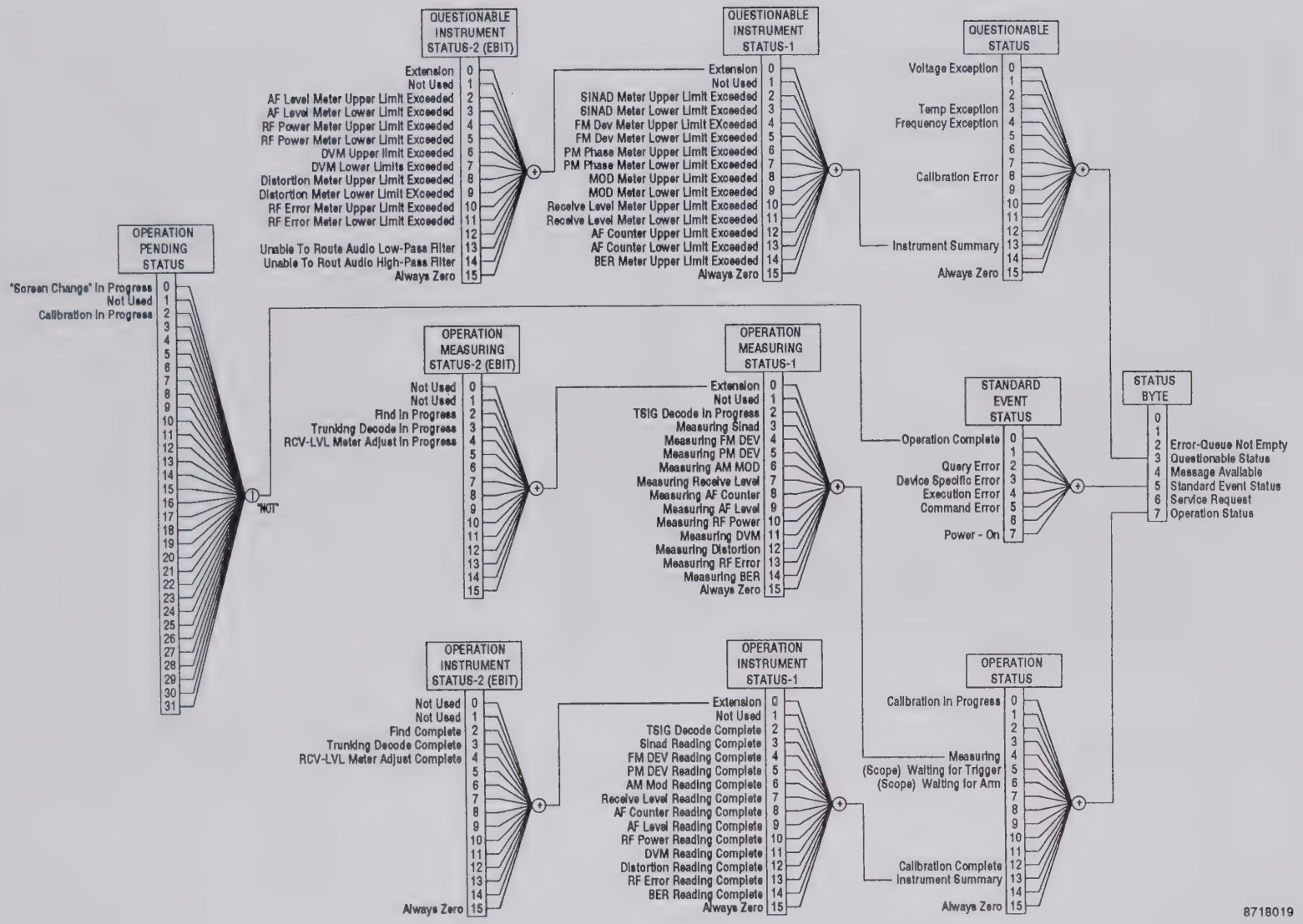


Figure 5-1 COM-120A Status Event Registers

5-5 ERROR CODES

ERROR CODE	ERROR DESCRIPTION
100	COMMAND ERROR
102	SYNTAX ERROR
108	PARAMETER NOT ALLOWED
109	MISSING PARAMETER
151	INVALID STRING DATA
160	BLOCK DATA ERROR
161	INVALID DATA BLOCK
170	EXPRESSION ERROR
180	MACRO ERROR
181	INVALID OUTSIDE MACRO DEFINITION
183	INVALID INSIDE MACRO DEFINITION
200	EXECUTION ERROR
221	SETTINGS CONFLICT
222	DATA OUT OF RANGE
223	TOO MUCH DATA
225	OUT OF MEMORY
230	DATA CORRUPT OR STALE
240	HARDWARE ERROR
241	HARDWARE MISSING; OPTION
250	MASS STORAGE ERROR
256	FILE NAME NOT FOUND
261	MATH ERROR IN EXPRESSION
272	MACRO EXECUTION ERROR
273	ILLEGAL MACRO LABEL
274	MACRO PARAMETER ERROR
278	MACRO HEADER NOT FOUND;UNDEFINED MACRO
282	ILLEGAL PROGRAM NAME;TASK NAME
283	ILLEGAL VARIABLE NAME
330	SELF-TEST FAILED
350	QUEUE OVERFLOW;TOO MANY ERRORS
400	QUERY ERROR

Error codes will cause the follow bits to be set:

ERROR CODES	BIT IN STANDARD EVENT STATUS
100 to 199	Bit5 - Command Error
200 to 299	Bit4 - Execution Error
300 to 399	Bit3 - Device Specific Error
400 to 499	Bit2 - Query Error

5-6 KEY CODE DEFINITIONS

NOTE: SYSTEM:KEY? returns -1 if no key has been pressed.

DESCRIPTION	KEY	CODE
** Memory Keys	STORE KEY RECALL KEY	0x80 0x81
** Screen Select Keys	RF FREQUENCY LIST KEY RCVR KEY RF GEN KEY AUDIO DATA GEN KEY SCOPE KEY METERS KEY DUPLEX KEY DUPLEX RCVR KEY DUPLEX GEN KEY SETUP KEY ANALY KEY START KEY SPECIAL TEST KEY	0x84 0x86 0x87 0x88 0x89 0x8A 0x8C 0xC0 0xC1 0x8D 0x8E 0x8F 0xC4
** Define the cursor keys for the non-edit mode.	FIELD CURSOR UP KEY FIELD CURSOR LEFT KEY FIELD CURSOR RIGHT KEY FIELD CURSOR DOWN KEY	0x90 0x91 0x92 0x93
** Scroll keys	CHARACTER CURSOR LEFT KEY CHARACTER CURSOR RIGHT KEY SCROLL CURSOR UP KEY SCROLL CURSOR DOWN KEY	0x12 0x13 0x14 0x15
** Define the independent meter mode keys	AF COUNTER METER SINAD METER DIGITAL VOLT METER DISTORTION METER RECEIVE POWER METER BIT ERROR RATE METER	0x94 0x95 0x96 0x97 0x98 0x99
** Define the Setup keys	CALIBRATE KEY GPIB KEY RS232 KEY BATTERY KEY CLOCK KEY VERSION KEY RUNTIME KEY DIAG KEY KEYBD KEY HOP KEY LOCK KEY SELFTEST KEY	0xA0 0xA1 0xA2 0xA3 0xA4 0xA5 0xA6 0xA7 0xA8 0xA9 0xAA 0xAB
** Define List keys	FRLIST KEY SETUP LIST KEY	0xC2 0xC3
** Define Pocrcv key	POCRCV KEY	0xC5

DESCRIPTION	KEY	CODE
** Define cellular keys	CELLULAR KEY	0xC6
	AUTO CELL KEY	0xC7
	MANUAL CELL KEY	0xC8
	SETUP1 CELL KEY	0xC9
	SETUP2 CELL KEY	0xCA
	MANUAL MOB CELL KEY	0xCB
	MANUAL INIT CELL KEY	0xCC
** Define LTR Trunking key	LTR TRUNKING KEY	0xCD
	LTR REPEAT TEST KEY	0xCE
	LTR RADIO TEST KEY	0xCF
	LTR AUTO SETUP KEY	0xD0
	DM MTR ZOOM KEY	0xD1
	SD MTR ZOOM KEY	0xD2
	AL MTR ZOOM KEY	0xD3
** Softkeys	SOFTKEY 1	0x01
	SOFTKEY 2	0x02
	SOFTKEY 3	0x03
	SOFTKEY 4	0x04
	SOFTKEY 5	0x05
	SOFTKEY 6	0x06
** Data entry keys	DATA KEY 0	0x30
	DATA KEY 1	0x31
	DATA KEY 2	0x32
	DATA KEY 3	0x33
	DATA KEY 4	0x34
	DATA KEY 5	0x35
	DATA KEY 6	0x36
	DATA KEY 7	0x37
	DATA KEY 8	0x38
	DATA KEY 9	0x39

SECTION 6 - OPTIONS

6-1 INTERNAL BATTERY (OPTION 01)

Provides self-contained dc power when external ac or dc power is unavailable.

6-2 OVEN CRYSTAL OSCILLATOR FREQUENCY STANDARD (OPTION 02)

OCXO replaces the standard TCXO as system time base. Provides 0.01 x 10^{-6} accuracy.

6-3 30 kHz IF FILTER (OPTION 03)

Provides additional band limiting between 15 kHz and 300 kHz offered in standard set. Required for AMPS Mobile Station Test (Option 15).

6-4 VARIABLE AUDIO GENERATOR 2 (OPTION 04)

Replaces standard fixed 1 kHz Audio Generator with variable frequency Audio Generator. Optional Audio Generator has frequency range of 0 to 20000 Hz with sine wave shape and 0 to 10000 Hz with ramp, triangle and square wave shapes.

Optional Audio Generator 2 is available for use on the RF Generate, Duplex and Duplex Generate Operation Screens as a modulation source. Additionally, it is available for baseband output from the Audio/Data/Signalling Generators Operation Screen.

6-5 GENERATE AMPLIFIER (OPTION 05)

The Generate Amplifier is an internal RF Amplifier providing 26 dB gain for AUX RF OUT Connector. With Option 05 installed, RF AUX OUT Connector output range is -130 to +13 dBm for all Operation Modes.

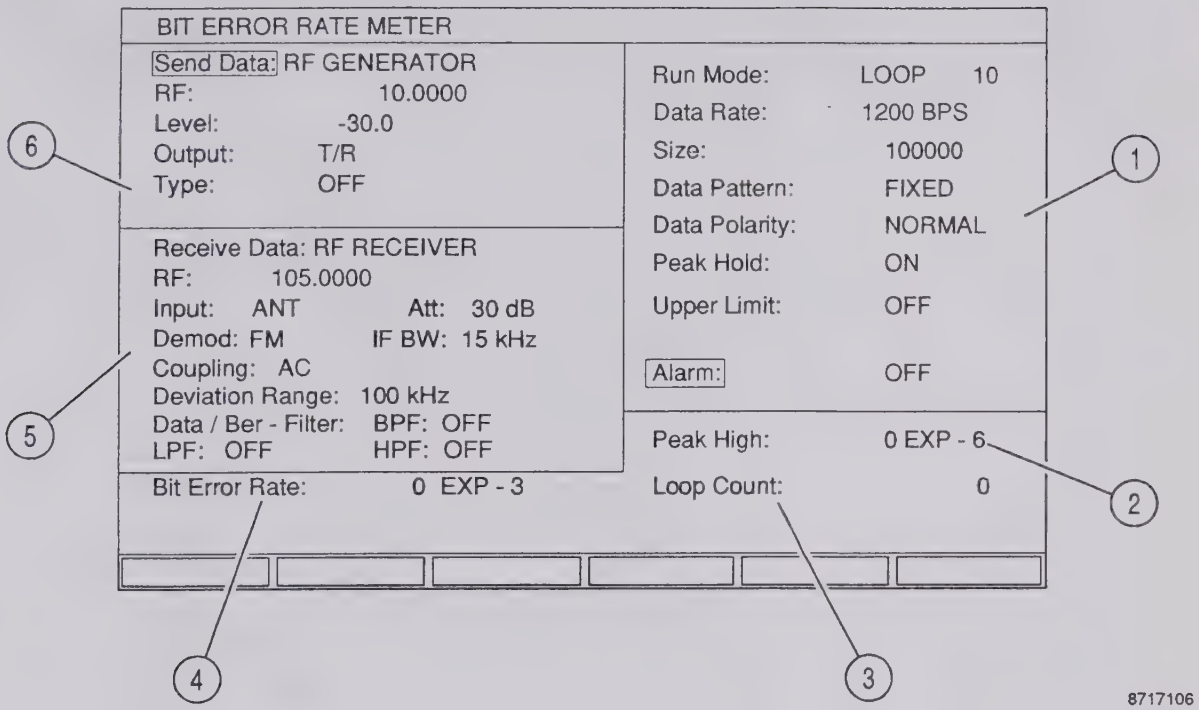
6-6 DATA GENERATOR/BIT ERROR RATE (BER) METER (OPTION 07)

6-6-1 BER METER DESCRIPTION

The BER Meter is accessed by first pressing SPCL TEST MODE Key and selecting the Bit Error Rate Test. The BER Meter is designed to be used in Baseband, RF Generate, RF Receive or Duplex Mode. The BER Meter is described in several sections due to complexity.

Section	Title	Page
A.	BER Meter General Operation Screen	6-3
B.	BER Meter Configuration Section	6-4
C.	Receive Data Configuration Section	6-8
D.	Send Data Configuration Section	6-14

A. BER METER GENERAL OPERATION SCREEN



ITEM	DESCRIPTION

1. BER Meter Configuration Section

   Contains configuration data for signal. Refer to 6-6-1(B) for additional information.

2. Peak Reading

   Displays highest Bit Error Rate for current test.

3. Loop Count

   Displays number of times Data has been sent.

4. Bit Error Rate.

   Displays Bit Error Rate. Exponent changes depending on Data Pattern Size (10).

5. Receive Data Configuration Section

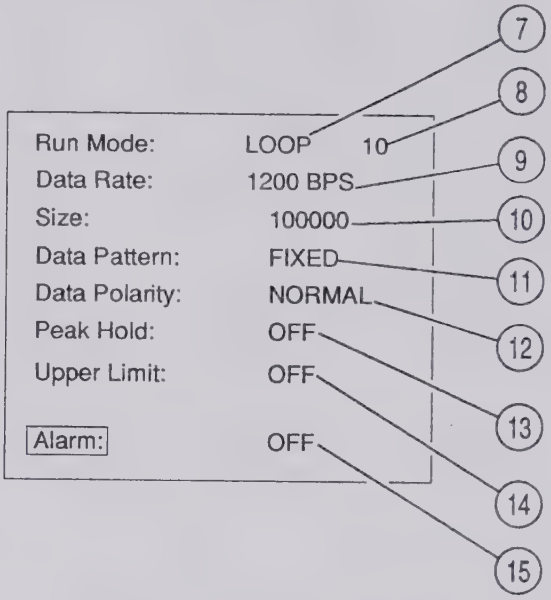
   Contains configuration data for Receive Section. Refer to 6-6-1(C) for additional information.

6. Send Data Configuration Section

   Contains configuration data for Generate Section. Refer to 6-6-1(D) for additional information.

B. BER METER CONFIGURATION SECTION

This section contains the parameters for setting the message size, rate and pattern as well as information on configuring the BER Meter. Functions and parameters for the BER Meter Configuration Section are as follows:



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ITEM	DESCRIPTION

7. Run Mode

Displays selected Operation Mode. Selections include Continuous (CONTIN.) and LOOP. When LOOP Mode is selected, LOOP Number (2) is displayed.

Soft Function Keys available include

F1 CONTIN.
Selects Continuous Run Mode.

F2 LOOP
Selects LOOp Run Mode.

F6 RETURN
Returns Operation to Special Test Menu.

8. LOOP Number

Displays selected number of Data Patterns to be Generated. Displayed only with LOOP selected for Run Mode (1). Range is 1 to 99999.

ITEM DESCRIPTION

9. Data Rate

Displays selected Data Rate in Bits Per Second (BPS). Selections include:

75 BPS	150 BPS	300 BPS
600 BPS	1200 BPS	2400 BPS
4800 BPS	9600 BPS	

Soft Function Keys available include:

F1 MENU
Accesses menu for selecting Data Rate.

F5 RST PK
Resets Peak Hold Function.

F6 RETURN
Returns Operation to Special Test Menu.

10. Data Pattern Size

Displays selected Data Pattern Size. Selections range from 128 to 100000 bits.

11. Data Pattern Type

Displays selected Data Pattern Type. Selections are RANDOM and FIXED. FIXED is an 8 bit hexadecimal pattern that is repeated. RANDOM is based on a pseudorandom seed.

Soft Function Keys available with this function include:

F1 RANDOM
Selects RANDOM Data Pattern Type.

F2 FIXED
Selects FIXED Data Pattern Type.

F5 RST PK
Resets Peak Hold Function.

F6 RETURN
Returns Operation to Special Test Menu.

12. Data Polarity

Displays selected Data Polarity Type. Displays NORMAL or INVERTED. INVERTED is the opposite code of NORMAL.

Soft Function Keys available with this function include:

F1 NORMAL
Selects NORMAL Data Polarity.

F2 INVERTED
Selects INVERTED Data Polarity.

F5 RST PK
Resets Peak Hold Function.

F6 RETURN
Returns Operation to Special Test Menu.

Operation Mode. Selections include Continuous (CONTIN.) and LOOP. When LOOP Mode is selected, LOOP Number (2) is displayed.

13. Peak Hold

Displays selected Peak Hold Function Status. Status is OFF or ON. When ON, Peak Reading (2) is displayed.

Soft Function Keys available with this function include:

F1 OFF/ON
Toggles Peak Hold Function ON and OFF.

F5 RST PK
Resets Peak Hold Function.

F6 RETURN
Returns Operation to Special Test Menu.

14. Upper Limit

Displays selected Upper Limit. Status is OFF or ON. When ON Upper Limit Value is displayed. Range of Upper Limit Value is 0×10^{-6} to 999×10^{-3}.

Soft Function Keys available with this function include:

F1 OFF/ON
Toggles Peak Hold Function ON and OFF.

F5 RST PK
Resets Peak Hold Function.

F6 RETURN
Returns Operation to Special Test Menu.

15. Alarm

Displays Alarm status. Status is OFF or ON. Alarm sounds when Upper Limit (14) is exceeded.

Soft Function Keys available with this function include:

F1 OFF/ON
Toggles Peak Hold Function ON and OFF.

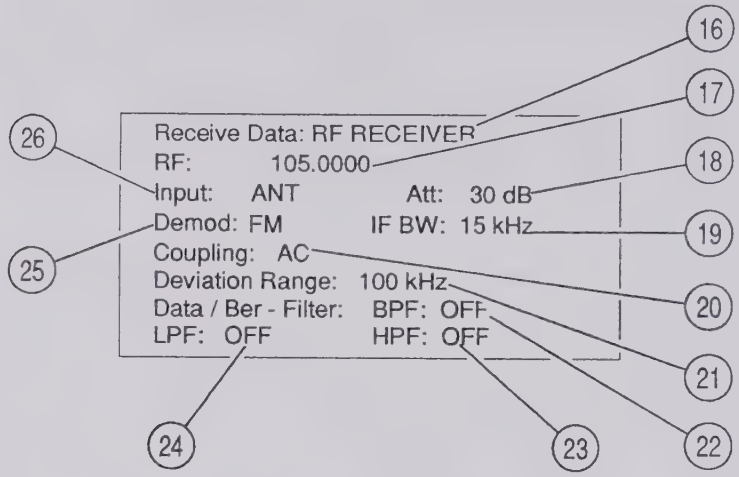
ITEM	DESCRIPTION

F5 RST PK
Resets Peak Hold Function.

F6 RETURN
Returns Operation to Special Test Menu.

C. RECEIVE DATA CONFIGURATION SECTION

This section contains the parameters for setting the Receiver Portion of the BER Meter. Functions and parameters for the Receiver portion of the BER Meter are as follows:



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ITEM	DESCRIPTION

16. Receive Data Input

Displays selected Input for BER Meter. Selections include RF RECEIVER and AUDIO DATA IN. Selecting RF RECEIVER means an RF Carrier is demodulated to receive the Data Signal. Selecting AUDIO DATA IN means Data Signal is received directly through the AUDIO/DATA IN Connector.

Soft Function Keys available with this function include:

F1 DEMOD
Selects RF RECEIVER as BER Meter Input.

F2 DATA IN
Selects AUDIO DATA IN as BER Meter Input.

F6 RETURN
Returns Operation to Special Test Menu.

The following items are displayed only when RF RECEIVER is selected as Receive Data Input (16):

ITEM DESCRIPTION

17. RF Field

Displays RF Receive Frequency. Selections range from .2500 to 1000 MHz.

18. Attenuation

Displays Input Attenuation. Selections are 0 or 30 dB.

Soft Function Keys available with this field include:

F1 30 dB
Selects 30 dB Input Attenuation.

F2 0 dB
Selects 0 dB Input Attenuation.

19. IF Bandwidth

Displays IF Filter Bandwidth. Selections are 300 and 15 kHz.

Soft Function Keys available with this field include:

F1 300 kHz
Selects 300 kHz IF Filter.

F2 15 kHz
Selects 15 kHz IF Filter.

20. Coupling

Displays Coupling Type for RF Receiver. Displayed only with FM selected for Demod Type (25). Selections are AC or DC.

Soft Function Keys available with this field include:

F1 AC
Selects AC Coupling.

F2 DC
Selects DC Coupling.

F6 RETURN
Returns Operation to Special Test Menu.

21. Deviation Range

Displays FM Deviation Range. Displayed only with FM selected for Demod Type (25). Selections are 10, 20, 50 and 100 kHz.

Soft Function Keys available with this field include:

F1 10 kHz
Selects 10 kHz Deviation Range.

F2 20 kHz
Selects 20 kHz Deviation Range.

F3 50 kHz
Selects 50 kHz Deviation Range.

F4 100 kHz
Selects 100 kHz Deviation Range.

F6 RETURN
Returns Operation to Special Test Menu.

22. Bandpass Filter

Displays Bandpass Filter setting for demodulated signal. Selections include OFF and C-MSG (C-Message Weighted Filter).

NOTE: High-Pass Filter/Low-Pass Filter combination and Bandpass Filter cannot be active simultaneously.

Soft Function Keys available with this function include:

F1 OFF
Sets Bandpass Filter to OFF.

F2 C-MSG
Activates C-Message Weighted Bandpass Filter.

23. High-Pass Filter

Displays current High-Pass Filter setting for demodulated signal. Selections include OFF, 300 Hz and 4 kHz.

NOTE: High Pass Filter/Low Pass Filter combination and Bandpass Filter cannot be active simultaneously.

Soft Function Keys available with this function include:

F1 OFF
Sets Bandpass Filter to OFF.

F2 300 Hz
Activates 300 Hz High-Pass Filter.

F3 4 kHz
Activates 4 kHz High-Pass Filter.

24. Low-Pass Filter

Displays current Low-Pass Filter setting for demodulated signal. Selections include OFF, 300 Hz, 4 kHz and 20 kHz.

NOTE: High-Pass Filter/Low-Pass Filter combination and Bandpass Filter cannot be active simultaneously.

Soft Function Keys available with this function include:

F1 OFF
Sets Bandpass Filter to OFF.

F2 300 Hz
Activates 300 Hz Low-Pass Filter.

F3 4 kHz
Activates 4 kHz Low-Pass Filter.

F4 20 kHz
Activates 20 kHz Low-Pass Filter

25. Demod Type

Displays Demodulation Type. Selections include FM, AM and PM. Selection of FM activates Coupling (20) and Deviation Range (21) Fields.

Soft Function Keys available with this field include:

F1 FM
Selects FM as Demodulation Type.

F2 AM
Selects AM as Demodulation Type.

F3 PM
Selects PM as Demodulation Type.

26. Input

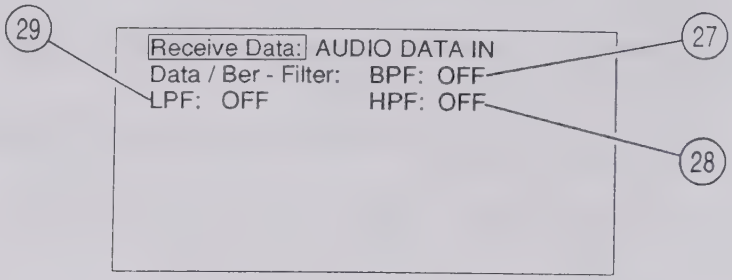
Displays signal Input Connector. Selections include T/R (T/R Connector) and ANT (ANTENNA Connector).

Soft Function Keys available with this field include:

F1 T/R
Selects T/R Connector as Input Connector.

F2 ANT
Selects ANTENNA Connector as Input Connector.

The following items are displayed only when AUDIO DATA IN is selected as Receive Data Input (16):



8717110

ITEM	DESCRIPTION

27. Bandpass Filter

Displays current Bandpass Filter setting for signal passed through AUDIO/DATA IN Connector. Selections include OFF and C-MSG (C-Message Weighted Filter).

NOTE: High-Pass Filter/Low-Pass Filter combination and Bandpass Filter cannot be active simultaneously.

Soft Function Keys available with this function include:

F1 OFF
Sets Bandpass Filter to OFF.

F2 C-MSG
Activates C-Message Weighted Bandpass Filter.

28. High-Pass Filter

Displays current High-Pass Filter setting for signal passed through AUDIO/DATA IN Connector. Selections include OFF, 300 Hz and 4 kHz.

NOTE: High-Pass Filter/Low-Pass Filter combination and Bandpass Filter cannot be active simultaneously.

Soft Function Keys available with this function include:

F1 OFF
Sets Bandpass Filter to OFF.

F2 300 Hz
Activates 300 Hz High-Pass Filter.

F3 4 kHz
Activates 4 kHz High-Pass Filter.

ITEM	DESCRIPTION

29. Low-Pass Filter

Displays current Low-Pass Filter setting for signal passed through AUDIO/DATA IN Connector. Selections include OFF, 300 Hz, 4 kHz and 20 kHz.

NOTE: High Pass Filter/Low Pass Filter combination and Bandpass Filter cannot be active simultaneously.

Soft Function Keys available with this function include:

F1 OFF
Sets Bandpass Filter to OFF.

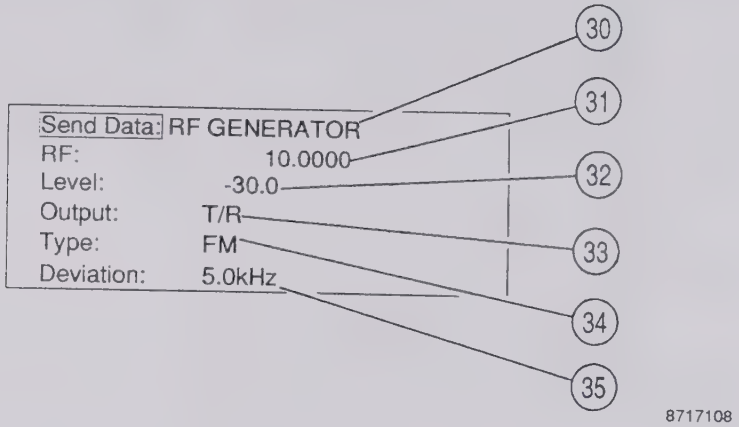
F2 300 Hz
Activates 300 Hz Low-Pass Filter.

F3 4 kHz
Activates 4 kHz Low-Pass Filter.

F4 20 kHz
Activates 20 kHz Low-Pass Filter

D. SEND DATA CONFIGURATION SECTION

This section contains the parameters for setting the Transmitter Portion of the BER Meter. Functions and parameters for the Transmitter portion of the BER Meter are as follows:



ITEM	DESCRIPTION

30. Send Data Output

Displays selected Output for BER Meter. Selections include RF GENERATOR and AUD/DATA GEN OUT. Selecting RF GENERATOR means an RF Carrier is modulated with the Data Signal before transmission. Selecting AUD/DATA GEN OUT means Data Signal is transmitted directly through the AUDIO/DATA GEN Connector.

Soft Function Keys available with this function include:

F1 RF GEN
Selects RF Generator as BER Meter source.

F2 DATA GEN
Selects Data Signal output through AUDIO/DATA GEN Connector.

F6 RETURN
Returns Operation to Special Test Menu.

The following items are displayed only when RF GENERATOR is selected as Send Data Output (30):

ITEM	DESCRIPTION

31. RF Field

Displays RF Generator Frequency. Selections range from .2500 to 1000 MHz.

32. Level

Displays RF Generator output Level. Selections range from -130 to -30 dBm with T/R Connector selected as Output (33). Selections range from -130 to -13 dBm with AUX RF OUT Connector selected as Output (33).

33. Output

Displays Output Connector. Selections include AUX (AUX RF OUT Connector) and T/R (T/R Connector).

Soft Function Keys available with this field include:

F1 T/R
Selects T/R Connector for Output.

F2 AUX
Selects AUX RF OUT Connector for Output.

34. Modulation Type

Displays Modulation Type. Selections include OFF, AM, FM and PM.

Soft Function Keys available with this field include:

F1 OFF
Set Modulation Source to OFF.

F2 AM
Selects AM for Modulation Type.

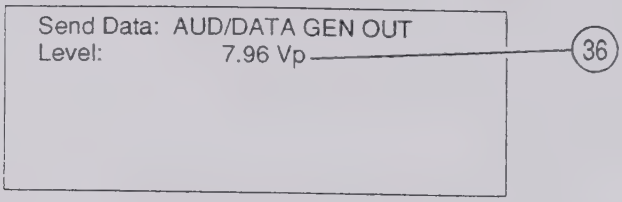
F3 FM
Selects AM for Modulation Type.

F4 PM
Selects AM for Modulation Type.

35. Modulation/Deviation Level

Displays Modulation Level. Selections range from 0% to 100% for AM Modulation Type (34), 0 to 100 kHz for FM Modulation Type (34) and 0 to 10 Rad for PM Modulation Type.

The following items are displayed only when AUD/DATA GEN OUT is selected as Send Data Output (30):



8717111

ITEM	DESCRIPTION

36. Output Level

Displays Output Level of Data Signal. Selections range from 0.0 to 2.5 Vp in x1 (times 1) Mode or 0 to 25 mVp in /100 (divide by 100) Mode.

F1 x1
Selects x1 Output Mode.

F2 /100
Selects /100 Output Mode.

6-7 SINGLE SIDEBAND RECEIVE FILTER (OPTION 08)

6-7-1 GENERAL

Installation of the Single Sideband Receive IF Filter provides the ability to monitor SSB signals. When Filter is installed, OPTION Selection is available for IF Bandwidth Filter. Additionally, an OPTION Soft Function Keys is defined.

The Single Sideband and 30 kHz IF Filters are mutually exclusive. Only one additional IF Filter can be installed.

6-7-2 DESCRIPTION OF RECEIVE FUNCTION

RF Receive Operation is changed as follows:

- Analyzer Center Frequency is offset from center graticule ±1800 Hz, depending on whether Upper Sideband (UB) or Lower Sideband (LB) is selected as Demodulation Type.
- No Modulation Meter is provided for Single Sideband. Either Modulation Reading or Modulation Meter, whichever was last selected, is blanked from the screen.
- RF Error Meter is not provided for Single Sideband. RF Error Meter is blanked from the screen.

Additions and Redefinitions of parameters on the RF Receiver Operation Screen are as follows:

ITEM	DESCRIPTION

1. Demodulation Type

   Includes two additional settings: UB (Upper Sideband) and LB (Lower Sideband).

   Additional Soft Function Keys include:

   F4 LB
   Selects Lower Sideband Demodulation.

   F5 UB
   Selects Upper Sideband Demodulation.

2. IF Bandwidth

   Includes additional setting. Additional setting is renamed depending on Demodulation Type (1). If Demodulation Type (1) is set to LB or UB, additional setting is listed as 3 kHz. If Demodulation Type (1) is any other setting, additional setting is listed as OPTION.

   Additional Soft Function Keys include:

   F3 3 kHz/OPTION
   Selects 3 kHz Optional IF Bandwidth Filter. Renamed depending on Demodulation Type (1).

ITEM	DESCRIPTION

3. BFO Frequency

   Tone/Data Code Field is renamed when UB or LB is selected as Demodulation Type (1). Displays selected adjustment for BFO Frequency. Adjustment range is ±4.0 kHz. No Soft Function Keys are defined when BFO Frequency is displayed.

4. AGC Setting

   Displays current AGC Setting. Selections include AUTO and MANUAL. AUTO provides automatic gain control while MANUAL sets feedback level for automatic gain control to defined level. Selection of MANUAL accesses Feedback Level Data Field. Range is 0 to 1023.

6-8 RCC SIGNALING FORMATS (OPTION 09)

Activates encode capabilities for 10 PS, 20 PS, MTS, IMTS and Tone Remote Control Signaling Formats. These formats appear as selections for GEN1 RF Generate Modulation Source, GEN1 Duplex Generate Modulation Source and Audio Function Generator 1. While these selections appear whether or not Option 9 is installed, they are not active. Accessing these selections is discussed in Section 3-3, Operation Screens and Menus.

6-9 AUDIO/DIGITAL SIGNALING FORMATS (OPTION 11)

Provides encode/decode capabilities for the following formats:

CCIR	CCIRH	CCIRH4
EEA	EIA	NATEL
ZVEI	DZVEI	DDZVEI
EURO	5/6 Tone	POCSAG

While these selections appear whether or not Option 11 is installed, they are not active. Accessing these selections is discussed in Section 3-3, Operation Screens and Menus.

6-10 SPECTRUM ANALYZER TRACKING GENERATOR (OPTION 12)

Provides internal Tracking Generator for use with Spectrum Analyzer. A new field is displayed for turning on the Tracking Generator. Field displays OFF or Tracking Generator Level. When active, an RF signal is available at the AUX RF OUT Connector at the specified level.

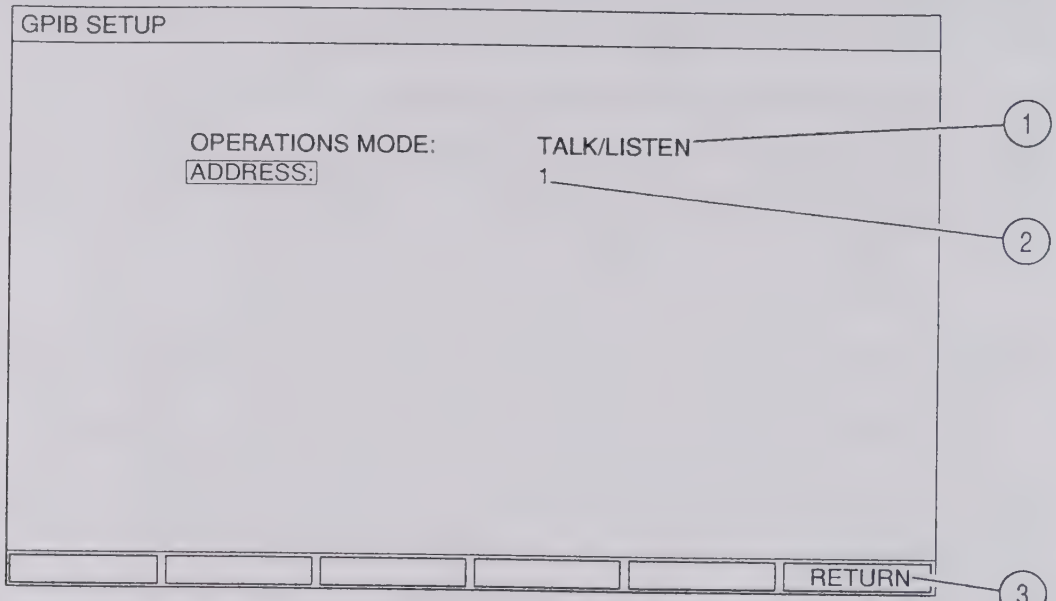
6-11 IEEE 488 (GPIB) INTERFACE (OPTION 13)

6-11-1 GENERAL

Provides parallel GPIB interface for remote operation. Refer to Section 5 for additional information on COM-120A Remote Operation and Commands listing.

6-11-2 CONFIGURING FOR REMOTE OPERATIONS USING GPIB

To access GPIB Setup Screen, Press SETUP MEMORY Key (21) and access "4. GPIB SETTINGS." Configure for GPIB Operation as follows:



8717030

STEP	PROCEDURE

1. Select Operations Mode (1). Available selections include TALK/LISTEN, TALK ONLY and LISTEN ONLY.
2. Select GPIB Address (2). Selections range from 1 to 30.
3. Set RCI Control to ***ON*** (para 5-2, Step 11).

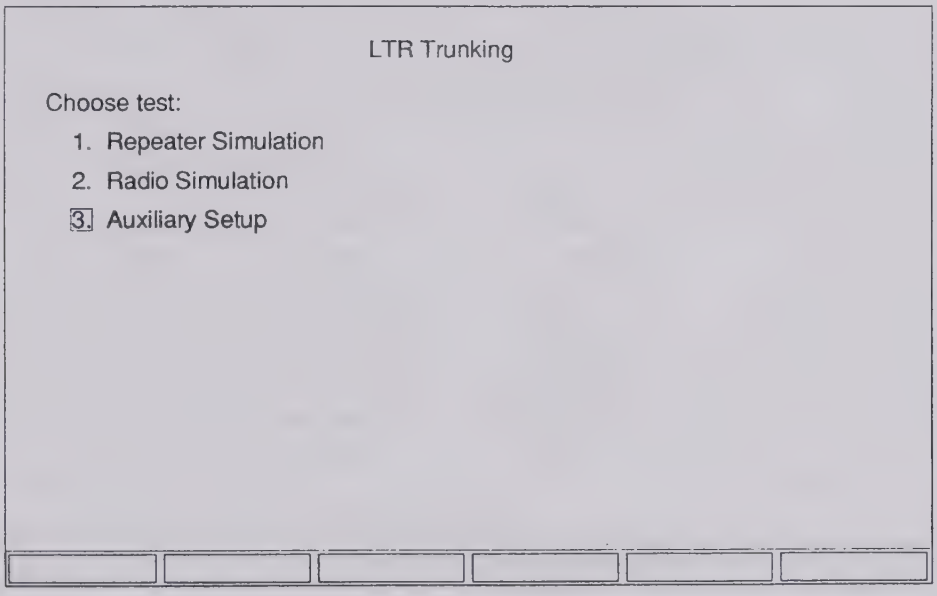
6-12 CLEARCHANNEL LTR® (OPTION 14)

6-12-1 GENERAL

The CLEARCHANNEL LTR® Option allows the testing of Trunked Repeaters and Radios. The COM-120A tests encode/decode, Repeater access and Handoff functions of Trunked Radio mobile units. The COM-120A tests Handshake and Handoff functions of Repeaters.

6-12-2 ACCESSING THE CLEARCHANNEL LTR® TRUNKING TEST SYSTEM

The CLEARCHANNEL LTR® is accessed by pressing the SPCL Test Mode Key and accessing "3. LTR Trunking." When accessed, the LTR Trunking Menu is displayed. The LTR Trunking Functions are as follows:



8717087

ITEM	DESCRIPTION

1. Repeater Simulation

   Configures COM-120A to simulate Repeater to test Mobile Radios. Refer to para 6-12-3 for description and para 6-12-6 for operation.

2. Radio Simulation

   Configures COM-120A to simulate a Mobile Radio to test Repeaters. Refer to para 6-12-4 for description and para 6-12-7 for operation.

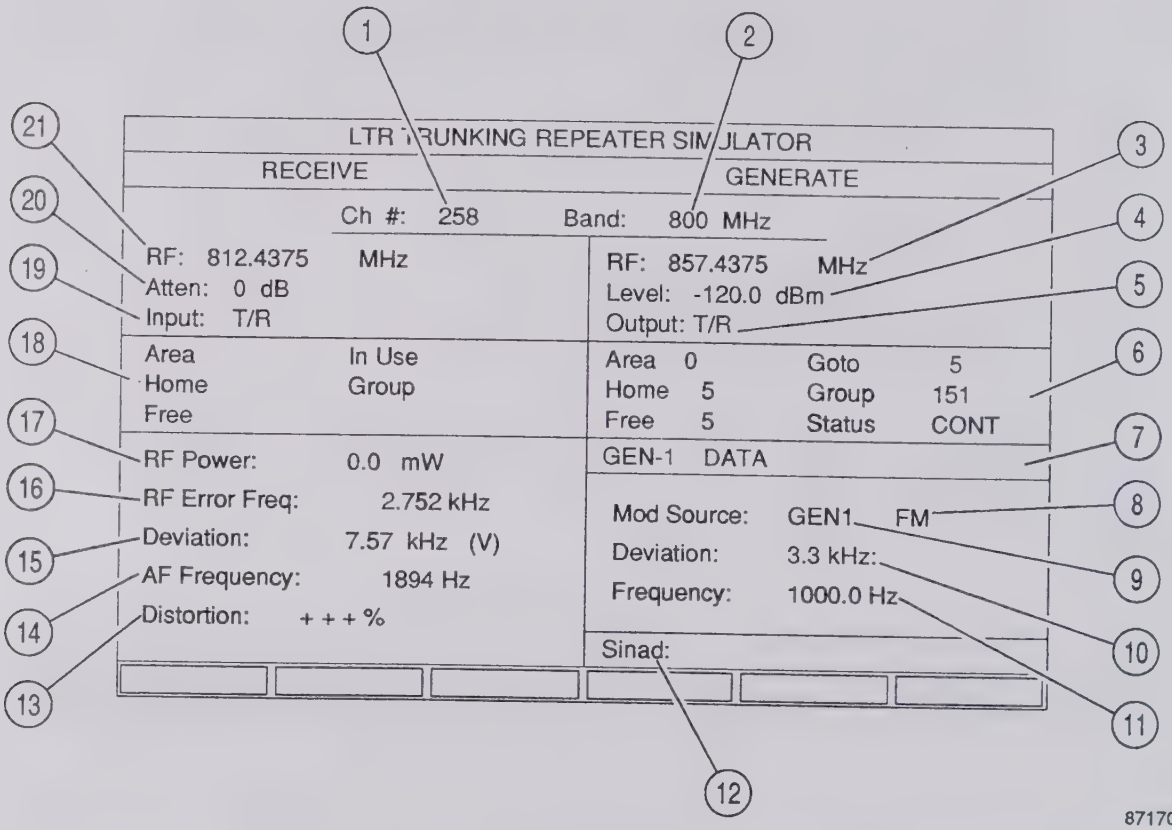
3. Auxiliary Setup

   Provides additional configuration for testing. Refer to para 6-12-5 for description.

6-12-3 LTR TRUNKING REPEATOR SIMULATION

A. LTR TRUNKING REPEATOR SIMULATOR OPERATION SCREEN

The LTR Repeater Simulator is designed to test mobile phones. An additional feature to the LTR Repeater Simulator Operation Screen is that once the LTR System is properly configured, continuous paging of the mobile phone is provided in the Duplex Operation Screen by setting DATA Generator to LTR. Features of the LTR Trunking Repeator Simulator Operation Screen are as follows:



8717089

ITEM	DESCRIPTION

1. Channel Number

   Displays Channel Number. Selections are 1 to 760. Selection of Channel Number and Band Selection (2) set Generate RF Field (3) and Receive RF Field (21).

   Soft Function Keys available include:

   F6 RETURN
   Returns Operation to LTR Trunking Menu.

2. Band Selection

   Displays Trunking Band Selection. Displays 800 or 900 MHz.

Soft Function Keys available include:

F1 800 MHz
Selects 800 MHz Trunking Band.

F2 900 MHz
Selects 900 MHz Trunking Band.

F6 RETURN
Returns Operation to LTR Trunking Menu.

3. Generate RF Field

Displays RF Generate Frequency of COM-120A. Value is dependent on Channel Number (1) and Band Selection (2). Field is for display only. Formula for figuring value is as follows where Channel # is Channel Number (1):

800 MHz Band Selection (2)

Frequency (MHz) = 851.0125 + [.025 x (Channel # - 1)]

900 MHz Band Selection (2)

Frequency (MHz) = 935.0125 + (.025 x Channel #)

NOTE: Radios operating in 800 MHz Band within range of Canada or Mexico must use a -12.5 kHz offset.

4. Level

Displays Output Level. Range is dependent on Output (5). Range for Output (5) set to T/R is -130 to -20 dBm. Range for Output (5) set to AUX is -130 to -13 dBm.

Soft Function Keys available include:

F6 RETURN
Returns Operation to LTR Trunking Menu.

5. Output

Displays Output Connector. Selections are T/R (T/R Connector) and AUX (AUX RF OUT Connector).

Soft Function Keys available include:

F1 T/R
Selects T/R Connector as output connector.

F2 AUX
Selects AUX RF OUT Connector as output connector.

F6 RETURN
Returns Operation to LTR Trunking Menu.

ITEM	DESCRIPTION

6. Transmit Trunking Data Block

   Displays current data being passed to mobile radio. Refer to 6-12-3(B) for additional information.

7. Modulation Source Window

   Displays active Modulation Sources (9). Inactive Modulation Sources (9) are not shown.

8. Modulation Source

   Displays selected Modulation Source. Selections include GEN1 (Audio Generator 1), GEN2 (Audio Generator 2), DTMF (DTMF Tone Generator) and DATA (DATA Generator).

   Soft Function Keys available include:

   F1 GEN-1
   Accesses Audio Generator 1 parameters.

   F2 GEN-2
   Accesses Audio Generator 2 parameters.

   F3 DTMF
   Accesses DTMF Generator parameters.

   F4 DATA
   Accesses DATA Generator parameters.

   F6 RETURN
   Returns Operation to LTR Trunking Menu.

9. Modulation Type

   Displays selected Modulation Type. Selections include OFF, AM, FM and PM.

   Soft Function Keys available include:

   F1 OFF
   Sets Modulation Source (9) to OFF.

   F2 AM
   Selects AM as Modulation Type.

   F3 FM
   Selects FM as Modulation Type.

   F4 PM
   Selects PM as Modulation Type.

   F6 RETURN
   Returns Operation to LTR Trunking Menu.

ITEM DESCRIPTION

10. Deviation/Modulation Level

Displays selected Deviation in kHz if current Modulation Type (8) is FM with range from 0.0 to 100 kHz. Displays selected Percent Modulation if current Modulation Type (8) is AM with range from 0% to 100%. Displays selected Deviation in Radians if current Modulation Type (8) is PM with range from 0 to 10 Radians. Field is not displayed if Modulation Type (8) is OFF.

Soft Function Keys available include:

F6 RETURN
Returns Operation to LTR Trunking Menu.

11. Frequency/Code Field

If Modulation Source (7) is set for GEN1 or GEN2, displays Tone Frequency. GEN2 Frequency is not an editable field unless Option Generator 2 is installed. Range for GEN1 is 0.0 to 20000 Hz. If Modulation Source (7) is set for DTMF, displays DTMF Code. Any DTMF code can be entered up to 16 characters. If Modulation Source (7) is set for DATA, field is blank.

Soft Function Keys available include:

F6 RETURN
Returns Operation to LTR Trunking Menu.

12. AUDIO/DATA IN Meters

Displays selected meter for measuring audio input to AUDIO/DATA IN Connector. Selections include Distortion, SINAD and AF LEVEL Meters. If one of these meters is active, Deviation Meter (15), AF Frequency Meter (14) and Distortion/DTMF Meter (13) are deactivated.

Soft Function Keys available include:

F1 DIST
Selects Distortion Meter as active meter.

F2 SINAD
Selects SINAD Meter as active meter.

F3 AF LVL
Selects AF Level as active meter.

F4 OFF
Deactivates AUDIO/DATA IN Meters and activates Deviation Meter (15), AF Frequency Meter (14) and Distortion/DTMF Meter (13).

F6 RETURN
Returns Operation to LTR Trunking Menu.

13. Distortion/DTMF Meters

Displays Distortion or DTMF. If Distortion is displayed as meter, distortion of demodulated signal is measured. If DTMF is displayed as meter, displays decoded DTMF Code from demodulated signal.

Soft Function Keys available include:

F1 DIST
Selects Distortion Meter as active meter.

F2 DTMF
Selects DTMF Decoding for field.

F3 OFF
Deactivates this meter.

F6 RETURN
Returns Operation to LTR Trunking Menu.

14. AF Frequency Counter

Displays AF Frequency of demodulated signal. Field is for display only.

15. Deviation Meter

Displays Deviation for data or audio (voice) as selected by operator. If Voice is Deviation Measurement is selected, (V) appears beside meter reading. If Data is selected, (D) appears beside meter reading.

Soft Function Keys available include:

F1 DATA
Selects DATA Deviation measurement.

F2 VOICE
Selects VOICE Deviation measurement.

F3 FMZ
Calibrates FM Detector when dc coupled.

F4 FM CAL
Offsets FM Detector to compensate for Transmitter Frequency Error in LTR Radio. Offsetting FM Detector "tunes" data decoder that decodes data from LTR Radio.

F6 RETURN
Returns Operation to LTR Trunking Menu.

16. RF Error Meter

Displays frequency error of LTR Transmitter referenced to Receive RF Field (21). Field is for display only.

ITEM DESCRIPTION

17. RF Power Meter

Displays RF Power, in Watts, applied to T/R Connector. If ANT is selected for Input (19), data field is blank. Field is for display only.

18. Receive Trunking Data Block

Displays data being passed from mobile radio. Refer to 6-12-3(C) for additional information.

19. Input

Displays selected Input Connector. Selections are ANT (ANTENNA Connector) or T/R (T/R Connector).

Soft Function Keys available include:

F1 T/R
Selects T/R Connector as Input Connector.

F2 ANT
Selects ANTENNA Connector as Input Connector.

F6 RETURN
Returns Operation to LTR Trunking Menu.

20. Attenuation

Displays selected Input Attenuation. Selections are 0 or 30 dB.

Soft Function Keys available include:

F1 30 dB
Selects 30 dB Input Attenuation.

F2 0 dB
Selects 0 dB Input Attenuation.

F6 RETURN
Returns Operation to LTR Trunking Menu.

21. Receive RF Field

Displays RF Receive Frequency of COM-120A. Value is dependent on Channel Number (1) and Band Selection (2). Field is for display only. Formula for figuring value is as follows where Channel # is Channel Number (1):

800 MHz Band Selection (2)

Frequency (MHz) = 806.0125 + [.025 x (Channel # - 1)]

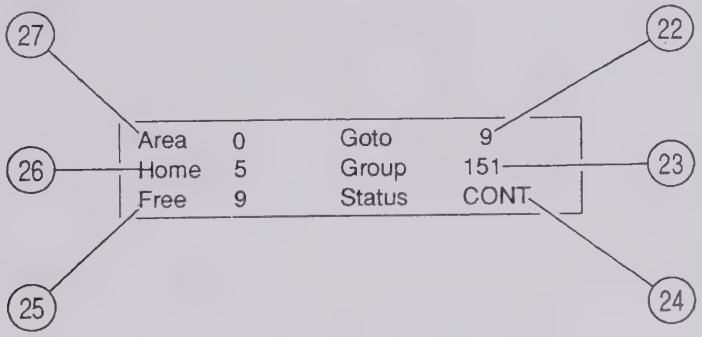
900 MHz Band Selection (2)

Frequency (MHz) = 896.0125 + (.025 x Channel #)

NOTE: Radios operating in 800 MHz Band within range of Canada or Mexico must use a -12.5 kHz offset.

B. TRANSMIT TRUNKING DATA BLOCK

The Transmit Trunking Data Block is used to set the Repeater paramaters that are passed to the Mobile Radios. This information, as well as the Channel Number (1) and Band Selection are required to test a Mobile Radio. A list of the Data Fields and available parameters follow:



8717113

ITEM	DESCRIPTION

22. Goto

Displays Repeater Number to use for Status (24) set to Continuous. Must match Home (26) for Mobile Radio to unsquelch. Range is 1 to 31.

Soft Function Keys available include:

F6 RETURN
Returns Operation to LTR Trunking Menu.

23. Group

Displays ID Code for Mobile Radio to Test. Range is 1 to 255. Information is passed when Repeater transmits to access selected Mobile Radio.

Soft Function Keys available include:

F6 RETURN
Returns Operation to LTR Trunking Menu.

24. Status

Displays Status for Repeater for testing Mobile Radio. Set to FREE (Free Home Repeater), BUSY (Busy Home Repeater), CONT (Continuous transmit by Home Repeater) and DISCN (Disconnect Repeater-Mobile link). If CONT is desired, Goto (22) must match Home (26).

Soft Function Keys available include:

F1 FREE
Sets Status to FREE (Free Home Repeater).

F2 BUSY
Sets Status to BUSY (Busy Home Repeater).

F3 CONT
Sets Status to CONT (Continuous transmit by Home Repeater).

F4 DISCN
Sets Status to DISCN (Disconnect Repeater-Mobile link).

F6 RETURN
Returns Operation to LTR Trunking Menu.

25. Free

Displays Repeater Number used for Mobile transmission with Status (24) set to BUSY. Free Repeater Channel on LTR Trunking Auxiliary Setup Screen (para 6-12-4) must also be set for proper operation. Range is 1 to 31.

26. Home

Displays Home Repeater Number used for testing Mobile Radios. Range is 1 to 31.

27. Area

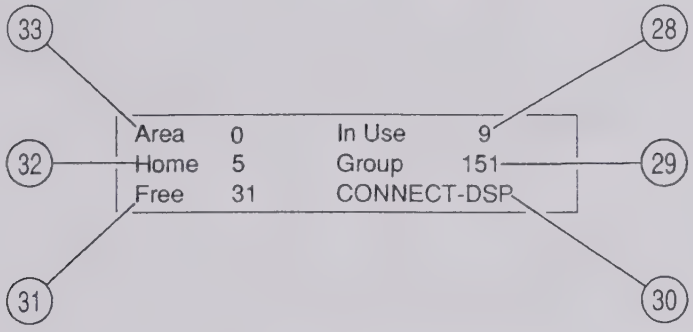
Displays Proximity Switch setting. Displays 1 or 0.

Soft Function Keys available include:

F6 RETURN
Returns Operation to LTR Trunking Menu.

C. RECEIVE TRUNKING DATA BLOCK

The Receive Trunking Data Block is used to display the Mobile Radio paramaters that are passed to the Repeater. This information is for display only and cannot be edited. A list of the Data Fields and available parameters follow:



8717114

ITEM	DESCRIPTION

28. In Use

Displays Repeater Number used by Mobile Radio. Displays 31 at message end to signify end of transmission.

29. Group

Displays ID Code for Mobile Radio.

30. Radio Status

Displays Mobile Radio Status. If CONNECT-DSP is displayed, Radio is currently linked to COM-120A in Dispatch Mode. If CONNECT-RIC is displayed, Radio is currently linked to COM-120A in Radio Interconnect Mode. If RELEASE is displayed, indicates COM-120A has received disconnect code from from Mobile Radio. If DISCONNECT is displayed, indicates Mobile Radio and Repeater are no longer connected due to manual disconnect or COM-120A disconnect due to elapsed time.

31. Free

Displays Free Field Data received from data. Displays 31 during normal operation.

32. Home

Displays Home Repeater Number for Mobile Radio. Range is 1 to 31.

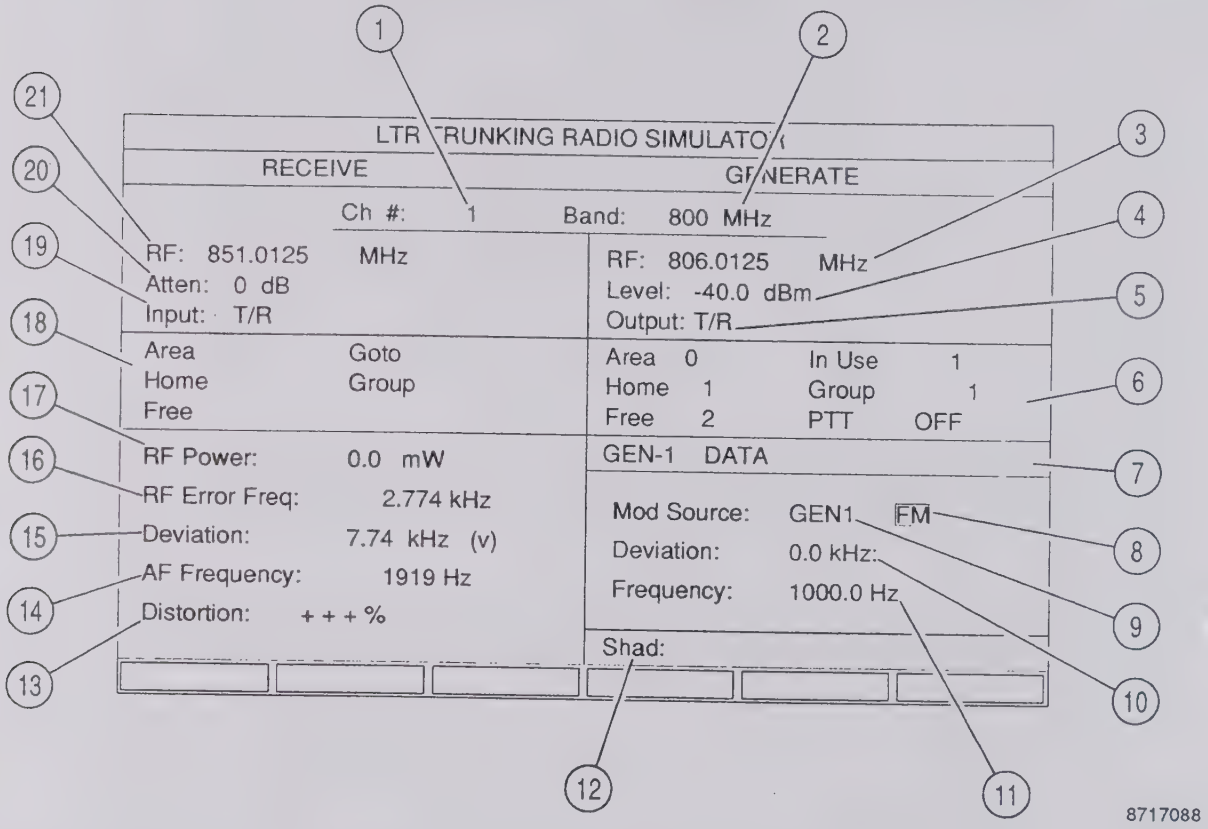
33. Area

Displays Proximity Switch setting. Displays 1 or 0.

6-12-4 LTR TRUNKING RADIO SIMULATION

A. LTR TRUNKING RADIO SIMULATOR OPERATION SCREEN

Features of the LTR Trunking Radio Simulator Operation Screen are as follows:



8717088

ITEM	DESCRIPTION

1. Channel Number

   Displays Trunking Channel Number. Selections range from 1 to 760. Selection of Channel Number and Band Selection (2) is used to set Generate RF Field (3) and Receive RF Field (21).

   Soft Function Keys available include:

   F6 RETURN
   Returns Operation to LTR Trunking Menu.

2. Band Selection

   Displays Trunking Band Selection. Displays 800 or 900 MHz.

Soft Function Keys available include:

F1 800 MHz
Selects 800 MHz Trunking Band.

F2 900 MHz
Selects 900 MHz Trunking Band.

F6 RETURN
Returns Operation to LTR Trunking Menu.

3. Generate RF Field

Displays RF Generate Frequency of COM-120A. Value is dependent on Channel Number (1) and Band Selection (2). Field is for display only. Formula for figuring value is as follows where Channel # is Channel Number (1):

800 MHz Band Selection (2)

Frequency (MHz) = 806.0125 + [.025 x (Channel # - 1)]

900 MHz Band Selection (2)

Frequency (MHz) = 896.0125 + (.025 x Channel #)

NOTE: Radios operating in 800 MHz Band within range of Canada or Mexico must use a -12.5 kHz offset.

4. Level

Displays Output Level. Range is dependent on Output (5). Range for Output (5) set to T/R is -130 to -20 dBm. Range for Output set to AUX is -130 to -13 dBm.

Soft Function Keys available include:

F6 RETURN
Returns Operation to LTR Trunking Menu.

5. Output

Displays Output Connector. Selections are T/R (T/R Connector) and AUX (AUX RF OUT Connector).

Soft Function Keys available include:

F1 T/R
Selects T/R Connector as output connector.

F2 AUX
Selects AUX RF OUT Connector as output connector.

F6 RETURN
Returns Operation to LTR Trunking Menu.

6. Transmit Trunking Data Block

Displays current data being passed to Repeater. Refer to 6-12-4(B) for additional information.

7. Modulation Source Window

Displays active Modulation Sources (9). Inactive Modulation Sources (9) are not shown.

8. Modulation Source

Displays selected Modulation Source. Selections include GEN1 (Audio Generator 1), GEN2 (Audio Generator 2), DTMF (DTMF Tone Generator) and DATA (DATA Generator).

Soft Function Keys available include:

F1 GEN-1
Accesses Audio Generator 1 parameters.

F2 GEN-2
Accesses Audio Generator 2 parameters.

F3 DTMF
Accesses DTMF Generator parameters.

F4 DATA
Accesses DATA Generator parameters.

F6 RETURN
Returns Operation to LTR Trunking Menu.

9. Modulation Type

Displays selected Modulation Type. Selections include OFF, AM, FM and PM.

Soft Function Keys available include:

F1 OFF
Sets Modulation Source (9) to OFF.

F2 AM
Selects AM as Modulation Type.

F3 FM
Selects FM as Modulation Type.

F4 PM
Selects PM as Modulation Type.

F6 RETURN
Returns Operation to LTR Trunking Menu.

ITEM	DESCRIPTION

10. Deviation/Modulation Level

Displays selected Deviation in kHz if current Modulation Type (8) is FM with range from 0.0 to 100 kHz. Displays selected Percent Modulation if current Modulation Type (8) is AM with range from 0% to 100%. Displays selected Deviation in Radians if current Modulation Type (8) is PM with range from 0 to 10 Radians. Field is not displayed if Modulation Type (8) is OFF.

Soft Function Keys available include:

F6 RETURN
Returns Operation to LTR Trunking Menu.

11. Frequency/Code Field

If Modulation Source (7) is set for GEN1 or GEN2, displays Tone Frequency. GEN2 Frequency is not an editable field unless Option Generator 2 is installed. Range for GEN1 is 0.0 to 20000 Hz. If Modulation Source (7) is set for DTMF, displays DTMF Code. Any DTMF code can be entered up to 16 characters. If Modulation Source (7) is set for DATA, field is blank.

Soft Function Keys available include:

F6 RETURN
Returns Operation to LTR Trunking Menu.

12. AUDIO/DATA IN Meters

Displays selected meter for measuring audio input to AUDIO/DATA IN Connector. Selections include Distortion, SINAD and AF LEVEL Meters. If one of these meters is active, Deviation Meter (15), AF Frequency Meter (14) and Distortion/DTMF Meter (13) are deactivated.

Soft Function Keys available include:

F1 DIST
Selects Distortion Meter as active meter.

F2 SINAD
Selects SINAD Meter as active meter.

F3 AF LVL
Selects AF Level as active meter.

F4 OFF
Deactivates AUDIO/DATA IN Meters and activates Deviation Meter (15), AF Frequency Meter (14) and Distortion/DTMF Meter (13).

F6 RETURN
Returns Operation to LTR Trunking Menu.

13. Distortion Meter

Displays distortion of demodulated signal.

Soft Function Keys available include:

F1 DIST
Selects Distortion Meter as active meter.

F2 OFF
Deactivates meter.

F6 RETURN
Returns Operation to LTR Trunking Menu.

14. AF Frequency Counter

Displays AF Frequency of demodulated signal. Field is for display only.

15. Deviation Meter

Displays Deviation for data or audio (voice) as selected by operator. If Voice is Deviation Measurement is selected, (V) appears beside meter reading. If Data is selected, (D) appears beside meter reading.

Soft Function Keys available include:

F1 DATA
Selects DATA Deviation measurement.

F2 VOICE
Selects VOICE Deviation measurement.

F3 FMZ
Calibrates FM Detector when dc coupled.

F4 FM CAL
Offsets FM Detector to compensate for Transmitter Frequency Error in LTR Radio. Offsetting FM Detector "tunes" data decoder that decodes data from Repeater.

F6 RETURN
Returns Operation to LTR Trunking Menu.

16. RF Error Meter

Displays frequency error of Repeater referenced to Receive RF Field (21). Field is for display only.

17. RF Power Meter

Displays RF Power, in Watts, applied to T/R Connector. If ANT is selected for Input (19), data field is blank. Field is for display only.

ITEM	DESCRIPTION

18. Receive Trunking Data Block

    Displays data being passed from Repeater. Refer to 6-12-4(C) for additional information.

19. Input

    Displays selected Input Connector. Selections are ANT (ANTENNA Connector) or T/R (T/R Connector).

    Soft Function Keys available include:

    F1 T/R
    Selects T/R Connector as Input Connector.

    F2 ANT
    Selects ANTENNA Connector as Input Connector.

    F6 RETURN
    Returns Operation to LTR Trunking Menu.

20. Attenuation

    Displays selected Input Attenuation. Selections are 0 or 30 dB.

    Soft Function Keys available include:

    F1 30 dB
    Selects 30 dB Input Attenuation.

    F2 0 dB
    Selects 0 dB Input Attenuation.

    F6 RETURN
    Returns Operation to LTR Trunking Menu.

21. Receive RF Field

Displays RF Receive Frequency of COM-120A. Value is dependent on Channel Number (1) and Band Selection (2). Field is for display only. Formula for figuring value is as follows where Channel # is Channel Number (1):

800 MHz Band Selection (2)

Frequency (MHz) = 851.0125 + [.025 x (Channel # - 1)]

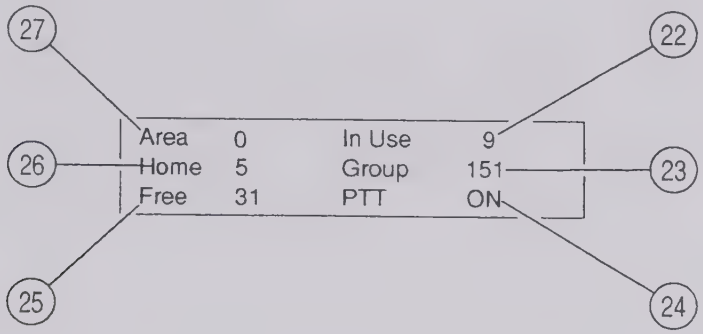
900 MHz Band Selection (2)

Frequency (MHz) = 935.0125 + (.025 x Channel #)

NOTE: Radios operating in 800 MHz Band within range of Canada or Mexico must use a -12.5 kHz offset.

B. TRANSMIT TRUNKING DATA BLOCK

The Transmit Trunking Data Block is used to set the Mobile Radio paramaters that are passed to the Repeater. This information, as well as the Channel Number (1) and Band Selection are required to test a Repeater. A list of the Data Fields and available parameters follows:



8717116

ITEM	DESCRIPTION

22. In Use

Displays Repeater Number used by Mobile Radio. Displays 31 at message end to signify end of transmission. Range is 1 to 31.

Soft Function Keys available include:

F6 RETURN
Returns Operation to LTR Trunking Menu.

23. Group

Displays ID Code for Mobile Radio serviced by Repeater. Range is 1 to 255.

Soft Function Keys available include:

F6 RETURN
Returns Operation to LTR Trunking Menu.

24. PTT

Displays Push-To-Talk Status passed to Repeater. Displays ON or OFF. Push-To Talk Status is toggled by pressing START/STOP CONTROL Key (6).

25. Free

Not used by Mobile Radios. Field is editable, but should contain 31 for normal operation. Range is 1 to 31.

Soft Function Keys available include:

F6 RETURN
Returns Operation to LTR Trunking Menu.

26. Home

Displays Home Repeater Number for Mobile Radio. Range is 1 to 31.

Soft Function Keys available include:

F6 RETURN
Returns Operation to LTR Trunking Menu.

27. Area

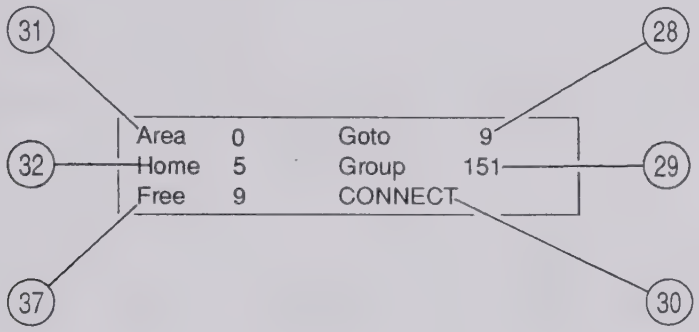
Displays Proximity Switch setting. Displays 1 or 0.

Soft Function Keys available include:

F6 RETURN
Returns Operation to LTR Trunking Menu.

C. RECEIVE TRUNKING DATA BLOCK

The Receive Trunking Data Block is used to display the Repeater paramaters that are passed to the Mobile Radio. This information is for display only and cannot be edited. A list of the Data Fields and available parameters follow:



8717115

ITEM	DESCRIPTION

28. Goto

Displays number of Repeater being tested. Display of 31 indicates end of transmission for Repeater.

29. Group

Displays ID Code specified by Group (23).

30. Repeater Status

Displays Repeater-Mobile Radio Connection Status. Displays CONNECT if Repeater is receiving COM-120A signal. Blank if not receiving signal.

31. Free

Displays Free Repeater data sent to COM-120A.

32. Home

Displays Home Repeater data sent by Repeater to COM-120A. Range is 1 to 31.

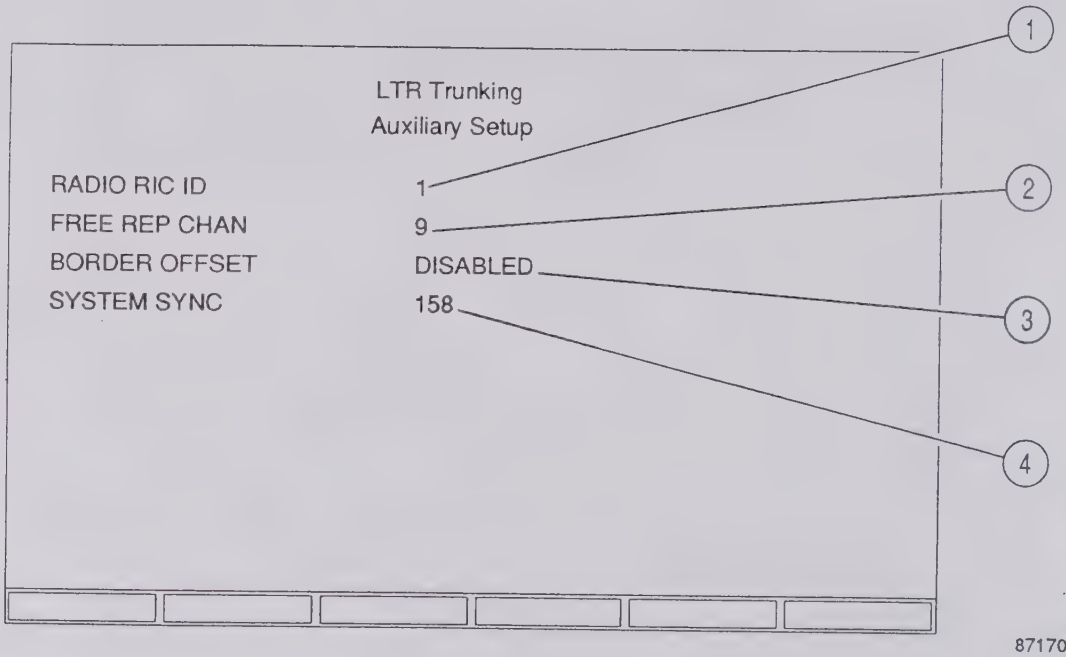
33. Area

Displays Proximity Switch setting.

Displays 1 or 0.

6-12-5 LTR TRUNKING AUXILIARY SETUP SCREEN

The LTR Trunking Auxiliary Setup Screen is provided to setup additional System Parameters not covered in the Simulation Screens. Additional System Parameters and available entries are as follows:



8717086

ITEM	DESCRIPTION

1. RADIO RIC ID

   Displays Mobile Radio Radio Interconnect Channel Number. Range is 1 to 250.

   Soft Function Keys available include:

   F6 RETURN
   Returns Operation to LTR Trunking Menu.

2. FREE REP CHAN

   Displays Free Repeater Channel Number for Free Repeater specified on LTR Trunking Repeator Simulator Operation Screen. Range is 1 to 255.

   Soft Function Keys available include:

   F6 RETURN
   Returns Operation to LTR Trunking Menu.

ITEM	DESCRIPTION

3. BORDER OFFSET

Displays status of Border Offset to RF due to proximity to Canadian or Mexican Border. Displays ENABLED or DISABLED.

Soft Function Keys available include:

F1 DISABLE
Disables Border Offset.

F2 ENABLE
Enables Border Offset.

F6 RETURN
Returns Operation to LTR Trunking Menu.

4. SYSTEM SYNC

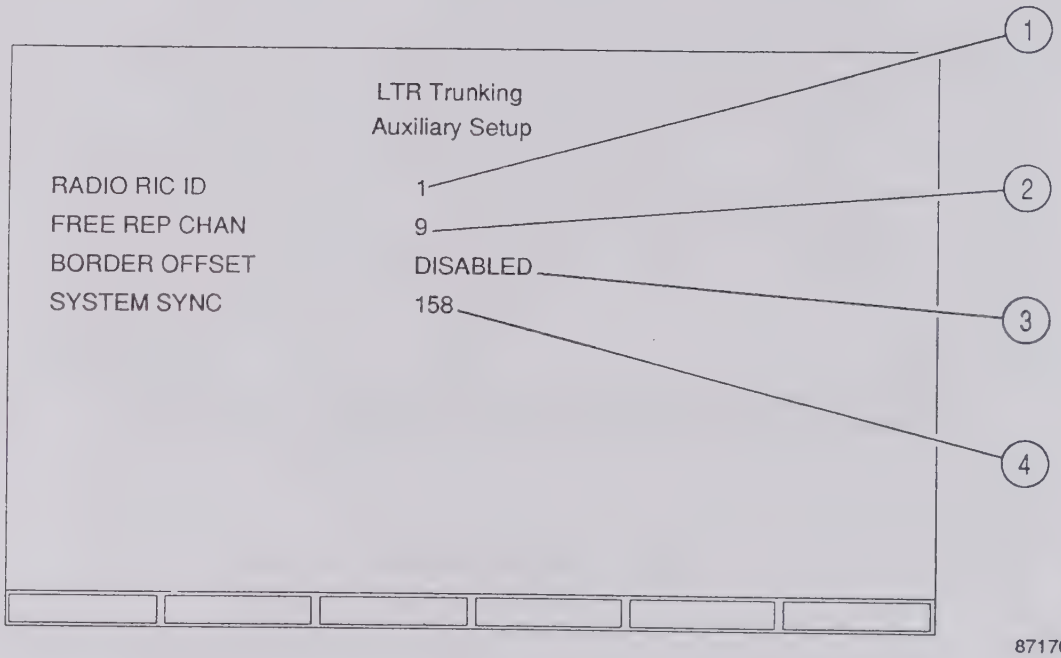
Displays hexadecimal code used for System Sync Code in Data Word. Default value is 158 (Hexadecimal). Range of value is 0 to 1FF (Hexadecimal).

Soft Function Keys available include:

F6 RETURN
Returns Operation to LTR Trunking Menu.

6-12-6 AUXILIARY SETUP SCREEN CONFIGURATION

The LTR Trunking Auxiliary Setup Screen must be configured before operating the LTR Trunking Repeater Simulator (para 6-12-7) or the LTR Trunking Radio Simulator (para 6-12-8). Configure the LTR Trunking Auxiliary Setup Screen as follows:



8717086

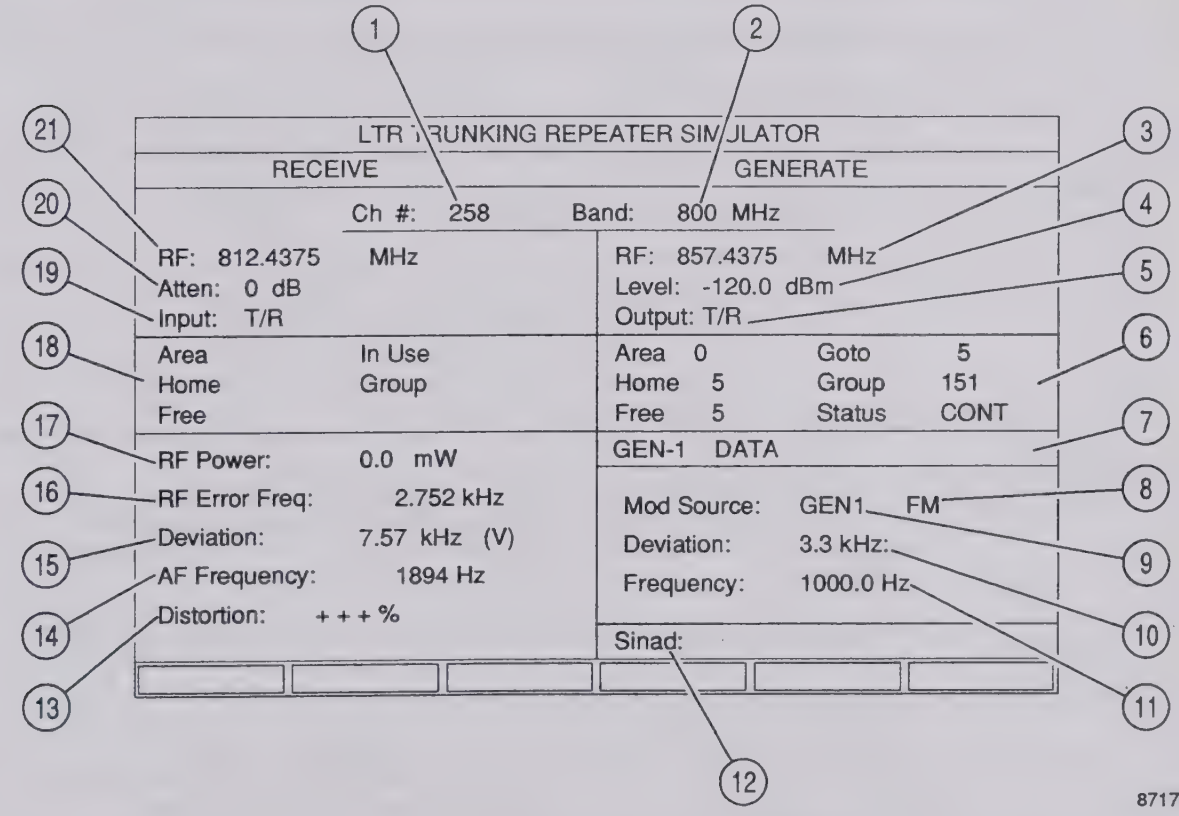
STEP	PROCEDURE

1. From LTR Trunking Menu, select "3. Auxiliary Setup."
2. If Mobile Radio RIC Test is required, set RADIO RIC ID (1) to Radio Interconnect Channel (RIC). IF RIC Operation is not required, set to value that will not interfere with Dispatch Operation.
3. If Mobile Radio Busy Home Repeater Test is desired, enter Free Repeater Channel for FREE REP CHAN (2).
4. If testing devices set for Border Offset, set BORDER OFFSET (3) to ***ENABLED***. If Border Offset is not required, set BORDER OFFSET (3) to ***DISABLED***.
5. Set SYSTEM SYNC (4) to ***158*** unless nonstandard system is tested.
6. Press RETURN Soft Function Key F6 to return to LTR Trunking Menu.

6-12-7 REPEATER SIMULATOR OPERATION

The Repeater Simulator is used to test LTR Mobile Radios. To test LTR Mobile Radios, knowledge of the Radio Configuration Data, for the Radio under test, is required. This section is divided into paragraphs with the first paragraph being General Configuration and the remaining paragraphs being different tests. For each test, the General Configuration should be performed first. To fully understand this section, the operator must read and understand para 6-12-3 and para 4-1.

A. LTR TRUNKING REPEATOR SIMULATOR GENERAL CONFIGURATION



8717089

STEP	PROCEDURE

1. Configure Auxiliary Setup Screen (para 6-12-5).
2. From LTR Trunking Menu, select "1. Repeater Simulation."
3. Enter Channel Number (1) of Mobile Radio. Range is 1 to 760.
4. Choose Band Selection (2). Selections are 800 or 900 MHz. Select as follows:
   - Press 800 MHz Soft Function Key F1 to select 800 MHz Band.
   - Press 900 MHz Soft Function Key F2 to select 900 MHz Band.

5. Select Output (5) for COM-120A Generator. Selections are T/R (T/R Connector) or AUX (AUX RF OUT Connector). Select as follows:
   - Press T/R Soft Function Key F1 to select T/R Connector.
   - Press AUX Soft Function Key F2 to select AUX RF OUT Connector.
6. Set Level (4) to desired Output Level. Range for Output (5) set to T/R is -130 to -40 dBm. Range for Output (5) set to AUX is -130 to -13 dBm.
7. Activate Modulation Source (9) as required. Activate as follows:
   - Activate GEN1 as follows:
     - With cursor at Modulation Source (9), press GEN1 Soft Function Key F1.
     - Set Modulation Type (8) as follows:
       - Press OFF Soft Function Key F1 to set Modulation Type (8) to ***OFF***.
       - Press AM Soft Function Key F2 to set Modulation Type (8) to ***AM***.
       - Press FM Soft Function Key F3 to set Modulation Type (8) to ***FM***.
       - Press PM Soft Function Key F4 to set Modulation Type (8) to ***PM***.
     - Set Deviation/Modulation Level to required level. With Modulation Type (8) set to ***FM***, range is 0.0 to 100 kHz. With Modulation Type (8) set to AM, range is 0% to 100%. With Modulation Type (8) set to PM, range is 0 to 10 Radians.
     - Set Audio Frequency for Frequency/Code Field (11). Range is 0.0 to 20000.0 Hz.
   - Activate GEN2 as follows:
     - With cursor at Modulation Source (9), press GEN2 Soft Function Key F2.
     - Set Modulation Type (8) as follows:
       - Press OFF Soft Function Key F1 to set Modulation Type (8) to ***OFF***.
       - Press AM Soft Function Key F2 to set Modulation Type (8) to ***AM***.
       - Press FM Soft Function Key F3 to set Modulation Type (8) to ***FM***.
       - Press PM Soft Function Key F4 to set Modulation Type (8) to ***PM***.
     - Set Deviation/Modulation Level to required level. With Modulation Type (8) set to ***FM***, range is 0.0 to 100 kHz. With Modulation Type (8) set to AM, range is 0% to 100%. With Modulation Type (8) set to PM, range is 0 to 10 Radians.

- Activate DTMF as follow:
  - With cursor at Modulation Source (9), press GEN1 Soft Function Key F1.
  - Set Modulation Type (8) as follows:
    - Press OFF Soft Function Key F1 to set Modulation Type (8) to ***OFF***.
    - Press AM Soft Function Key F2 to set Modulation Type (8) to ***AM***.
    - Press FM Soft Function Key F3 to set Modulation Type (8) to ***FM***.
    - Press PM Soft Function Key F4 to set Modulation Type (8) to ***PM***.
  - Set Deviation/Modulation Level to required level. With Modulation Type (8) set to ***FM***, range is 0.0 to 100 kHz. With Modulation Type (8) set to AM, range is 0% to 100%. With Modulation Type (8) set to PM, range is 0 to 10 Radians.
  - Enter Code for Frequency/Code Field (11).
- Activate DATA as follows:
  - With cursor at Modulation Source (9), press DATA Soft Function Key F4.
  - DATA Modulation Type (8) must be set to ***FM*** for the Repeater Simulator to communicate with Mobile Radios, however, the field is editable. Set Modulation Type (8) as follows:
    - Press OFF Soft Function Key F1 to set Modulation Type (8) to ***OFF***.
    - Press AM Soft Function Key F2 to set Modulation Type (8) to ***AM***.
    - Press FM Soft Function Key F3 to set Modulation Type (8) to ***FM***.
    - Press PM Soft Function Key F4 to set Modulation Type (8) to ***PM***.
  - Set Deviation/Modulation Level to required level. Normally, this is 1.0 kHz. With Modulation Type (8) set to ***FM***, range is 0.0 to 100 kHz. With Modulation Type (8) set to AM, range is 0% to 100%. With Modulation Type (8) set to PM, range is 0 to 10 Radians.

8. If AUDIO/DATA IN Meter Operation is required, select desired Meter as follows:

   NOTE: If AUDIO/DATA IN Meter Operation is selected, Deviation Meter (15), AF Frequency Meter (14), and Distortion/DTMF Meter are deactivated.

   - Press DIST Soft Function Key F1 to select Distortion Meter.
   - Press SINAD Soft Function Key F2 to select SINAD Meter.
   - Press AF LVL Soft Function Key F3 to select Audio Frequency Level.

- Press OFF Soft Function Key F4 to deactivate AUDIO/DATA IN Meter Operation.

9. If Distortion/DTMF Meter Operation is required, select desired Meter as follows:

   - Press DIST Soft Function Key F1 to select Distortion Meter Operation.
   - Press DTMF Soft Function Key F2 to select DTMF Decode Operation.
   - Press OFF Soft Function Key F3 to deactivate Distortion/DTMF Meter Operation.

10. Configure Deviation Meter (15) as follows:

    - Press DATA Soft Function Key F1 to measure deviation of Data signal.
    - Press VOICE Soft Function Key F2 to measure deviation of Voice signal.
    - Press FMZ Soft Function Key F3 to calibrate FM Detector.
    - Press FM CAL to compensate for transmitter error in Mobile Radio.

11. Select Input (19) for desired Input Connector. Selections include T/R (T/R Connector) and ANT (ANTENNA Connector). If Mobile Radio output is >0 dBm, select T/R. If ANT Input (19) is selected and Mobile Radio Output is >30 dBm, set Attenuation (20) for 30 dB. Select as follows:

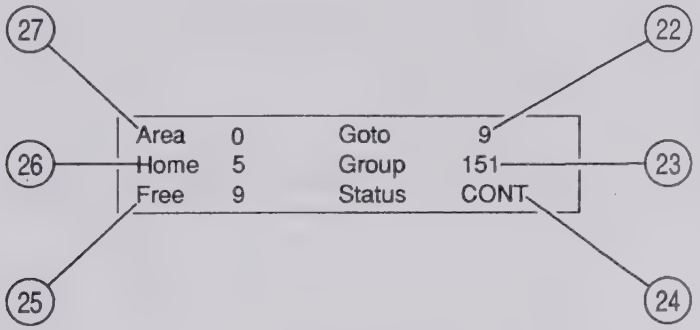
    - Press T/R Soft Function Key F1 to select T/R Connector.
    - Press ANT Soft Function Key F2 to select ANTENNA Connector.

12. Set Attenuation (20). Selections include 0 dB and 30 dB. If ANT Input (19) is selected and Mobile Radio Output is >30 dBm, set Attenuation (20) for 30 dB. Select as follows:

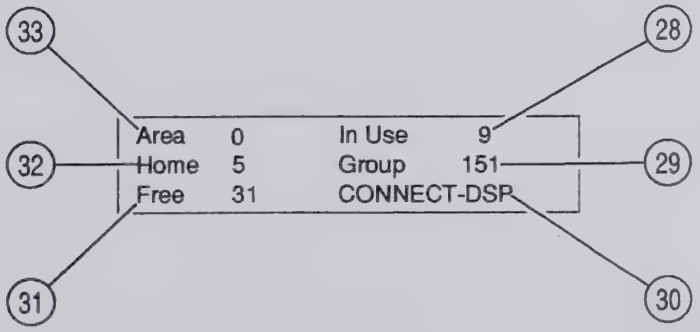
    - Press 30 dB Soft Function Key F1 to set Attenuation (20) for ***30 dB***.
    - Press 0 dB Soft Function Key F2 to set Attenuation (20) for ***0 dB***.

B. LTR RADIO HANDSHAKE TEST

This test verifies that the COM-120A is able to link with the Mobile Radio and a proper encode/decode sequence is performed. Additional tests that can be performed simultaneously include RF Power Measurement, RF Error Measurement, Voice FM Deviation Measurement, Data FM Deviation Measurement, AF Frequency Measurement and Distortion Measurement.



8717113



8717114

STEP	PROCEDURE

1. Perform para 6-12-6(B). AUDIO/DATA IN Meters (12) are not used with this test. Set Deviation Meter (15) to measure Voice or Data FM Deviation as needed.
2. Set Group (23) for ID Code of Mobile Radio.
3. Set Status (24) to ***FREE***.
4. Set Home (26) to Mobile Radio Home Repeater Number.
5. Set Area (27) for Mobile Radio Area switch setting.
6. Connect Mobile Radio RF Output to connector specified by Input (19).

STEP	PROCEDURE

7. Connect Mobile Radio RF Input to connector specified by Output (5).

8. Key Mobile Radio. Verify ***CONNECT-DSP*** or ***CONNECT-RIC*** is displayed for Radio Status (30).

9. Verify Group (29) matches Group (23).

10. Verify Home (32) and In Use (28) match Home (26).

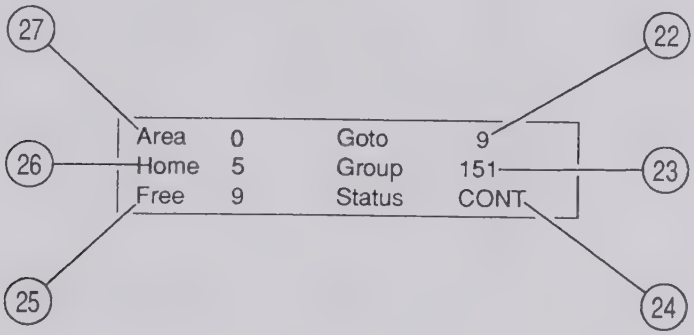
11. Verify Area (33) matches Area (27).

12. Verify Free (31) displays ***31***.

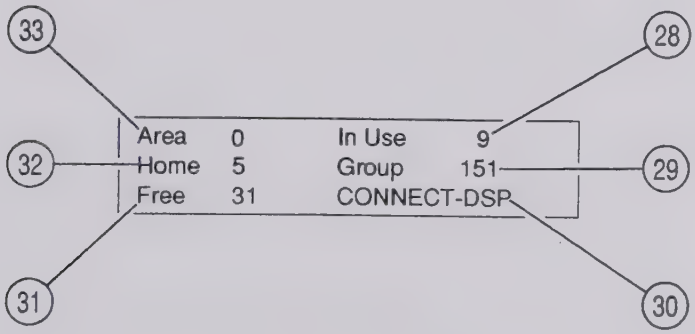
13. Unkey Mobile Radio. Verify Release is displayed for Radio Status (30). Verify In Use (28) displays ***31***.

C. LTR RADIO HANDOFF TEST

This test verifies that the COM-120A is able to link with the Mobile Radio and a proper Handoff to a free repeater is performed. Additional tests that can be performed simultaneously include RF Power Measurement, RF Error Measurement, Voice FM Deviation Measurement, Data FM Deviation Measurement, AF Frequency Measurement and Distortion Measurement.



8717113



8717114

STEP	PROCEDURE

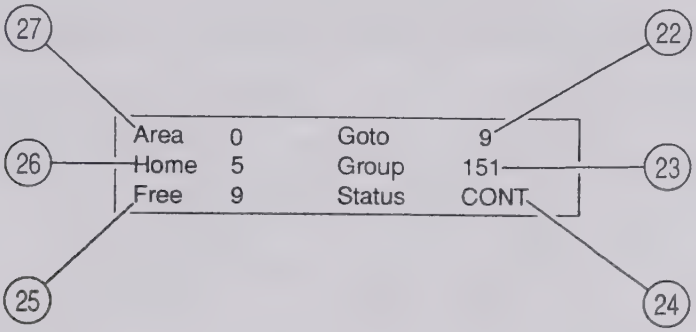
1. Perform para 6-12-6(B). AUDIO/DATA IN Meters (12) are not used with this test. Set Deviation Meter (15) to measure Voice or Data FM Deviation as needed.
2. Set Group (23) for ID Code of Mobile Radio.
3. Set Status (24) to ***BUSY***.
4. Set Free (25) for Mobile Radio Free Repeater Number.
5. Set Home (26) to Mobile Radio Home Repeater Number.
6. Set Area (27) for Mobile Radio Area switch setting.

STEP	PROCEDURE

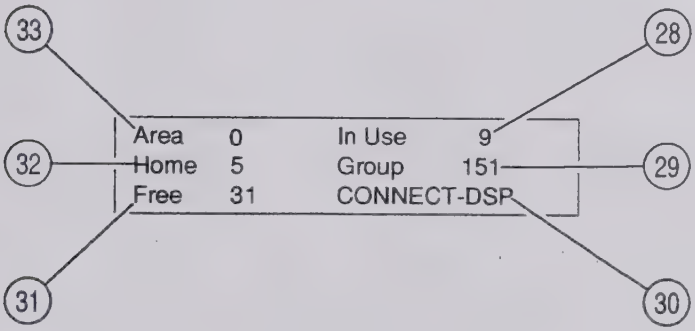
7. Connect Mobile Radio RF Output to connector specified by Input (19).
8. Connect Mobile Radio RF Input to connector specified by Output (5).
9. Key Mobile Radio. Verify ***CONNECT-DSP*** or ***CONNECT-RIC*** is displayed for Radio Status (30).
10. Verify Group (29) matches Group (23).
11. Verify Home (32) matches Home (26).
12. Verify In Use (28) matches Free (25).
13. Verify Area (33) matches Area (27).
14. Verify Free (31) displays ***31***.
15. Unkey Mobile Radio. Verify Release is displayed for Radio Status (30). Verify In Use (28) displays ***31***.

D. LTR RADIO RECEIVE TEST

This test verifies that the COM-120A is able to link with the Mobile Radio and an audio modulated RF Signal transmitted by the COM-120A is received by the Mobile Radio. Additional tests that can be performed simultaneously include the AUDIO/DATA IN Meters to measure Distortion, SINAD and AF Level of the signal demodulated by the Mobile Radio.



8717113



8717114

STEP	PROCEDURE

1. Perform para 6-12-6(B). If AUDIO/DATA IN Meters (12) are required, set following parameters:
   - Set Modulation Source for ***GEN1***.
   - Set Modulation Type (9) to ***FM***.
   - Set Deviation/Modulation Level for ***3.3 kHz***.
   - Set Frequency/Code Field for ***1000.0 Hz***.
2. Set Goto (22) to Home Repeater Number for Mobile Radio.

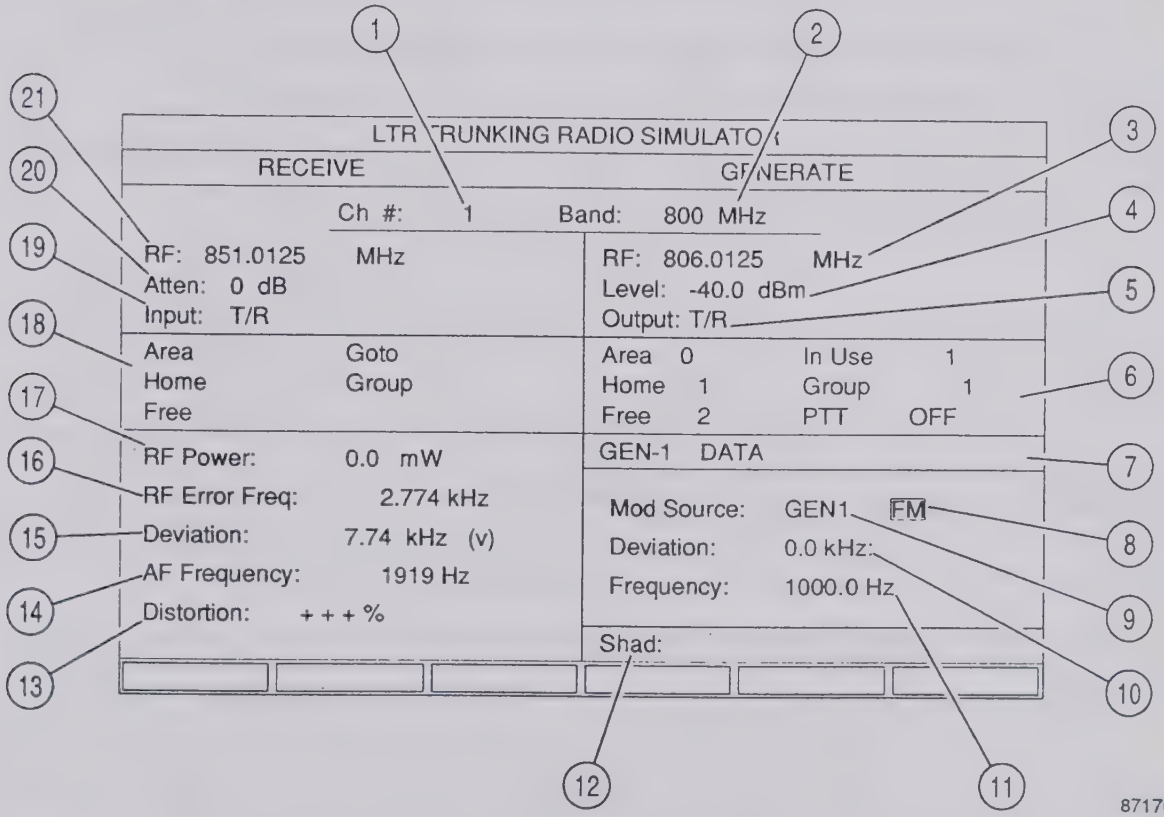
STEP	PROCEDURE

3. Set Group (23) for ID Code of Mobile Radio.
4. Set Status (24) to ***CONT***.
5. Set Home (26) to Mobile Radio Home Repeater Number.
6. Set Area (27) for Mobile Radio Area switch setting.
7. Connect Mobile Radio RF Output to connector specified by Input (19).
8. Connect Mobile Radio RF Input to connector specified by Output (5).
9. Connect Mobile Radio Audio Output to AUDIO/DATA IN Connector.
10. Verify 1000 kHz audio tone is audible.
11. Verify AUDIO/DATA IN Meter Measurement, if required.

6-12-8 RADIO SIMULATOR OPERATION

The Radio Simulator is used to test LTR Repeaters. To test LTR Repeaters, knowledge of the Radio Configuration Data, for the Mobile Radios that are serviced by the Repeater being tested, is required. This section is divided into paragraphs with the first paragraph being General Configuration and the remaining paragraphs being different tests. For each test, the General Configuration must be performed first. To fully understand this section, the operator must read and understand para 6-12-4 and para 4-1.

A. LTR TRUNKING RADIO SIMULATOR GENERAL CONFIGURATION.



STEP	PROCEDURE

1. Configure Auxiliary Setup Screen (para 6-12-5).
2. From LTR Trunking Menu, select "1. Radio Simulation."
3. Enter Channel Number (1). Range is 1 to 760.
4. Choose Band Selection (2). Selections are 800 or 900 MHz. Select as follows:
   - Press 800 MHz Soft Function Key F1 to select 800 MHz Band.
   - Press 900 MHz Soft Function Key F2 to select 900 MHz Band.

5. Select Output (5) for COM-120A Generator. Selections are T/R (T/R Connector) or AUX (AUX RF OUT Connector). Select as follows:
   - Press T/R Soft Function Key F1 to select T/R Connector.
   - Press AUX Soft Function Key F2 to select AUX RF OUT Connector.
6. Set Level (4) to desired Output Level. Range for Output (5) set to T/R is -130 to -40 dBm. Range for Output (5) set to AUX is -130 to -13 dBm.
7. Activate Modulation Source (9) as required. Activate as follows:
   - Activate GEN1 as follows:
     - With cursor at Modulation Source (9), press GEN1 Soft Function Key F1.
     - Set Modulation Type (8) as follows:
       - Press OFF Soft Function Key F1 to set Modulation Type (8) to ***OFF***.
       - Press AM Soft Function Key F2 to set Modulation Type (8) to ***AM***.
       - Press FM Soft Function Key F3 to set Modulation Type (8) to ***FM***.
       - Press PM Soft Function Key F4 to set Modulation Type (8) to ***PM***.
     - Set Deviation/Modulation Level to required level. With Modulation Type (8) set to ***FM***, range is 0.0 to 100 kHz. With Modulation Type (8) set to AM, range is 0% to 100%. With Modulation Type (8) set to PM, range is 0 to 10 Radians.
     - Set Audio Frequency for Frequency/Code Field (11). Range is 0.0 to 20000.0 Hz.
   - Activate GEN2 as follows:
     - With cursor at Modulation Source (9), press GEN2 Soft Function Key F2.
     - Set Modulation Type (8) as follows:
       - Press OFF Soft Function Key F1 to set Modulation Type (8) to ***OFF***.
       - Press AM Soft Function Key F2 to set Modulation Type (8) to ***AM***.
       - Press FM Soft Function Key F3 to set Modulation Type (8) to ***FM***.
       - Press PM Soft Function Key F4 to set Modulation Type (8) to ***PM***.
     - Set Deviation/Modulation Level to required level. With Modulation Type (8) set to ***FM***, range is 0.0 to 100 kHz. With Modulation Type (8) set to AM, range is 0% to 100%. With Modulation Type (8) set to PM, range is 0 to 10 Radians.

- Activate DTMF as follow:
  - With cursor at Modulation Source (9), press GEN1 Soft Function Key F1.
  - Set Modulation Type (8) as follows:
    - Press OFF Soft Function Key F1 to set Modulation Type (8) to ***OFF***.
    - Press AM Soft Function Key F2 to set Modulation Type (8) to ***AM***.
    - Press FM Soft Function Key F3 to set Modulation Type (8) to ***FM***.
    - Press PM Soft Function Key F4 to set Modulation Type (8) to ***PM***.
  - Set Deviation/Modulation Level to required level. With Modulation Type (8) set to ***FM***, range is 0.0 to 100 kHz. With Modulation Type (8) set to AM, range is 0% to 100%. With Modulation Type (8) set to PM, range is 0 to 10 Radians.
  - Enter Code for Frequency/Code Field (11).
- Activate DATA as follows:
  - With cursor at Modulation Source (9), press DATA Soft Function Key F4.
  - DATA Modulation Type (8) must be set to ***FM*** for the Radio Simulator to communicate with Repeaters, however, the field is editable. Set Modulation Type (8) as follows:
    - Press OFF Soft Function Key F1 to set Modulation Type (8) to ***OFF***.
    - Press AM Soft Function Key F2 to set Modulation Type (8) to ***AM***.
    - Press FM Soft Function Key F3 to set Modulation Type (8) to ***FM***.
    - Press PM Soft Function Key F4 to set Modulation Type (8) to ***PM***.
  - Set Deviation/Modulation Level to required level. Normally, this is 1.0 kHz. With Modulation Type (8) set to ***FM***, range is 0.0 to 100 kHz. With Modulation Type (8) set to AM, range is 0% to 100%. With Modulation Type (8) set to PM, range is 0 to 10 Radians.

8. If AUDIO/DATA IN Meter Operation is required, select desired Meter as follows:

   NOTE: If AUDIO/DATA IN Meter Operation is selected, Deviation Meter (15), AF Frequency Meter (14) and Distortion/DTMF Meter are deactivated.

   - Press DIST Soft Function Key F1 to select Distortion Meter.
   - Press SINAD Soft Function Key F2 to select SINAD Meter.
   - Press AF LVL Soft Function Key F3 to select Audio Frequency Level.

- Press OFF Soft Function Key F4 to deactivate AUDIO/DATA IN Meter Operation.

9. If Distortion Meter Operation is required, select as follows:

   - Press DIST Soft Function Key F1 to select Distortion Meter Operation.
   - Press OFF Soft Function Key F2 to deactivate Distortion/DTMF Meter Operation.

10. Configure Deviation Meter (15) as follows:

    - Press DATA Soft Function Key F1 to measure deviation of Data signal.
    - Press VOICE Soft Function Key F2 to measure deviation of Voice signal.
    - Press FMZ Soft Function Key F3 to calibrate FM Detector.
    - Press FM CAL to compensate for transmitter error in Repeater.

11. Select Input (19) for desired Input Connector. Selections include T/R (T/R Connector) and ANT (ANTENNA Connector). If Repeater output is >0 dBm, select T/R. If ANT Input (19) is selected and Repeater Output is >30 dBm, set Attenuation (20) for 30 dB. Select as follows:

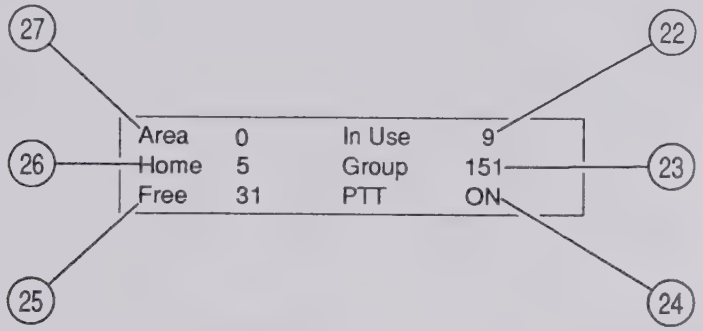
    - Press T/R Soft Function Key F1 to select T/R Connector.
    - Press ANT Soft Function Key F2 to select ANTENNA Connector.

12. Set Attenuation (20). Selections include 0 dB and 30 dB. If ANT Input (19) is selected and Repeater Output is >30 dBm, set Attenuation (20) for 30 dB. Select as follows:

    - Press 30 dB Soft Function Key F1 to set Attenuation (20) for ***30 dB***.
    - Press 0 dB Soft Function Key F2 to set Attenuation (20) for ***0 dB***.

B. LTR REPEATER HANDSHAKE TEST

This test verifies that the COM-120A is able to link with the Repeater and a proper encode/decode sequence is performed. Additional tests that can be performed simultaneously include RF Power Measurement, RF Error Measurement, Voice FM Deviation Measurement, Data FM Deviation Measurement, AF Frequency Measurement and Distortion Measurement.



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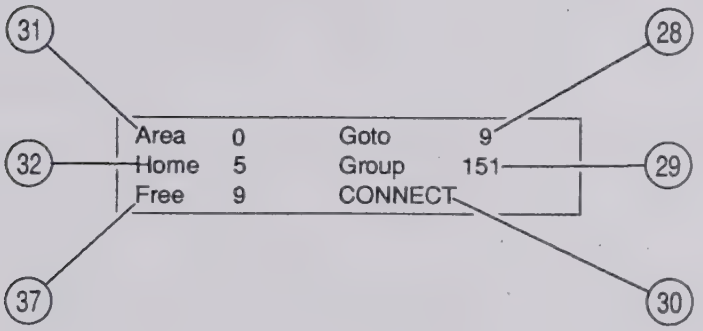

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STEP	PROCEDURE

1. Perform para 6-12-6(B). AUDIO/DATA IN Meters (12) are not used with this test. Set Deviation Meter (15) to measure Voice or Data FM Deviation as needed.
2. Set Group (23) for ID Code of Mobile Radio being simulated.
4. Set In Use (22) and Home (26) to Repeater Number.
5. Set Area (27) for simulated Mobile Radio Area switch setting.
6. Connect Repeater RF Output to connector specified by Input (19).
7. Connect Mobile Radio RF Input to connector specified by Output (5).

8. Press START/STOP CONTROL Key. Verify ***CONNECT*** is displayed for Repeater Status (30).

9. Verify Group (29) matches Group (23).

10. Verify Home (32) and Goto (28) matches Home (26).

11. Verify Area (33) matches Area (27).

12. Verify Free (31) displays Free Repeater Number for Simulated Mobile Radio.

6-13 AMPS CELLULAR TESTING (OPTION 15)

The AMPS Cell Site Simulator is Option 15 of the COM-120A and is used to test AMPS Mobile Telephone Equipment. This option is accessed by pressing SPCL Test Mode Key and selecting "2. Cellular."

6-13-1 AMPS CELL SITE SIMULATOR SETUP

The COM-120A is set up for AMPS Mobile Phone testing by the following procedure:

STEP	PROCEDURE

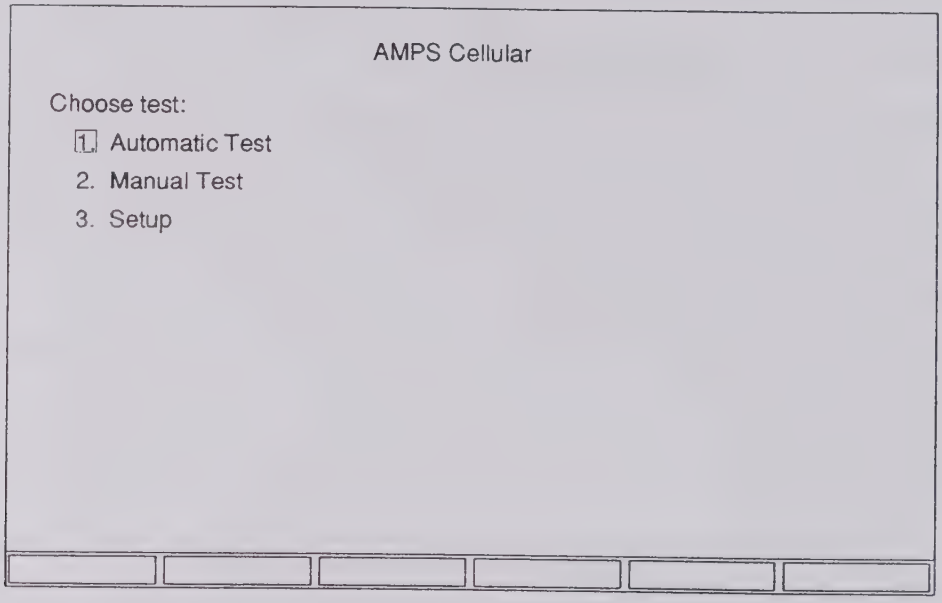
1. Press SPCL Mode Key. Select "2. Cellular" from the Options Menu.
2. Rotate SQUELCH Control ccw until squelch is set to minimum.
3. Rotate VOLUME Control fully ccw and then cw, until static becomes audible.
4. Rotate SQUELCH Control cw, slowly, until static is no longer audible.

   NOTE: If "data parity error" message is displayed during test operation, squelch setting may be to low.

   Squelch levels higher than necessary can prevent AMPS testing from functioning.
5. Connect T/R Connector to Output Connector of Mobile Phone.
6. Turn Mobile Phone power on.
7. To perform Audio Test, connect demodulated audio output connector of Mobile Phone to AUDIO/DATA IN Connector.

6-13-2 AMPS CELL SITE SIMULATOR MAIN AND SETUP MENUS

Accessing "2. Cellular" from the Options Menu accesses the AMPS Cellular Menu. The Automatic Test and Manual Test and Setup Screens are selected from this Menu.



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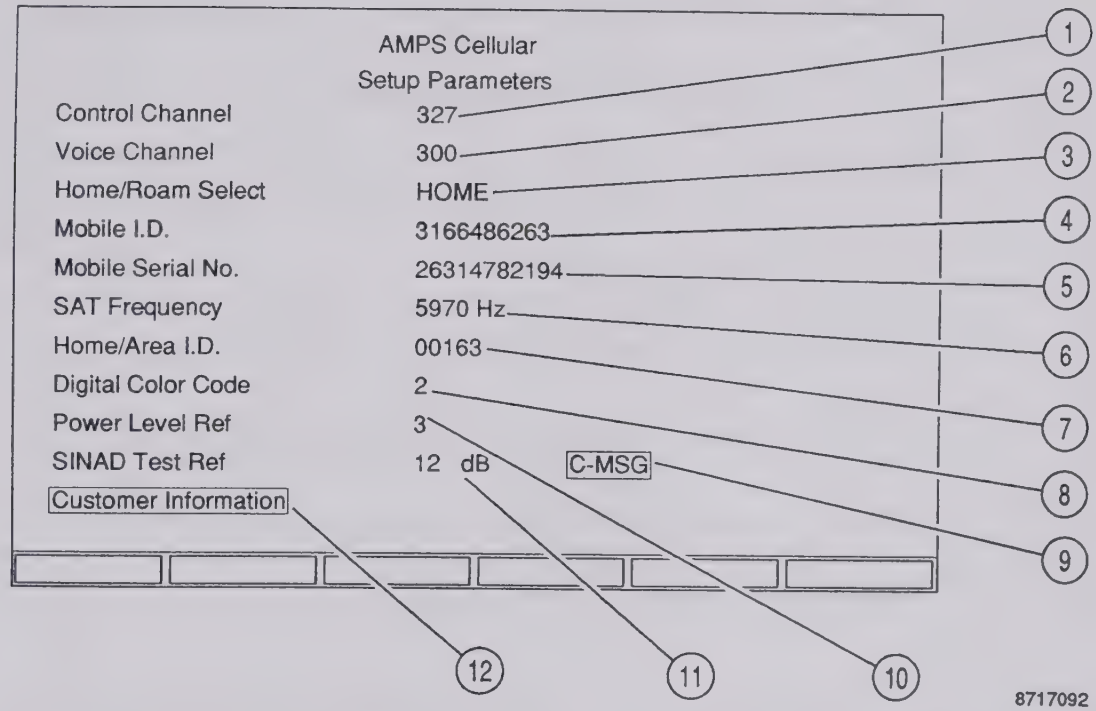
The parameters used for the Automatic and Manual Tests are selected through the AMPS Setup Screen. The AMPS Setup Menu is divided into 2 screens: Pages 1 and 2. Access "3. Setup" from the AMPS Cellular Menu to display Page 1 of the AMPS Setup Screen. Following is a listing of the AMPS Setup parameters, their uses and ranges.



ITEM	DESCRIPTION

1. Control Channel

   Selects simulated Control Channel. Range is 1 to 1023. Select using DATA ENTRY Keys. Press ENTER Key to complete edit.

   Soft Function Keys available include:

   F5 PG DN
   Selects Page 2 of AMPS Setup Screen.

   F6 RETURN
   Returns operation to AMPS Cellular Menu.

2. Voice Channel

   Selects simulated Voice Channel. Range is 1 to 1023. Select using DATA ENTRY Keys. Press ENTER Key to complete edit.

Soft Function Keys available include:

F5 PG DN
Selects Page 2 of AMPS Setup Screen.

F6 RETURN
Returns Operation to AMPS Cellular Menu.

3. Home/Roam Select

Selects simulated Home or Roaming Registration. Selections are Home or Roam.

Soft Function Keys available include:

F1 HOME
Selects simulated Home Registration.

F2 ROAM
Selects simulated Roaming Registration.

F5 PG DN
Selects Page 2 of AMPS Setup Screen.

F6 RETURN
Returns Operation to AMPS Cellular Menu.

4. Mobile I.D.

Selects the Mobile Identification Number (MIN) used to identify Mobile Phone. Maximum length is 10 characters using A to D, 0 to 9, * and # character. Select using DATA ENTRY Keys. Press ENTER Key to complete edit.

NOTE: Performing Registration Test automatically enters MIN of Mobile Phone.

Soft Function Keys available include:

F1 CLEAR
Clears current entry.

F5 PG DN
Selects Page 2 of AMPS Setup Screen.

F6 RETURN
Returns Operation to AMPS Cellular Menu.

5. Mobile Serial No.

Selects Electronic Serial Number (ESN) used to identify Mobile Phone. Length is 11 digits. Select using DATA ENTRY Keys. Press ENTER Key to complete edit.

Soft Function Keys available include:

F1 CLEAR
Clears current entry.

F5 PG DN
Selects Page 2 of AMPS Setup Screen.

F6 RETURN
Returns Operation to AMPS Cellular Menu.

6. SAT Frequency

Selects SAT Frequency simulated. Selections include 5970, 6000 or 6030 Hz.

Soft Function Keys available include:

F1 5970 Hz
Selects 5970 Hz SAT Frequency.

F2 6000 Hz
Selects 6000 Hz SAT Frequency.

F3 6030 Hz
Selects 6030 Hz SAT Frequency.

F5 PG DN
Selects Page 2 of AMPS Setup Screen.

F6 RETURN
Returns Operation to AMPS Cellular Menu.

7. Home/Area I.D.

Selects System Identification Number (SID) used to test Home System Identification of Mobile Phone. Length is 5 digits. Select using DATA ENTRY Keys. Press ENTER Key to complete edit.

Soft Function Keys available include:

F1 CLEAR
Clears current entry.

F5 PG DN
Selects Page 2 of AMPS Setup Screen.

F6 RETURN
Returns Operation to AMPS Cellular Menu.

8. Digital Color Code

Selects Digital Color Code (DCC) simulated. Range is 0 to 3. Select using DATA ENTRY Keys. Press ENTER Key to complete edit.

Soft Function Keys available include:

F5 PG DN
Selects Page 2 of AMPS Setup Screen.

F6 RETURN
Returns Operation to AMPS Cellular Menu.

9. Audio Test Filter

Displays Audio Filter setting for SINAD Test. Selections include C-MSG (C-Message Weighted Bandpass Filter) and 20 kHz Low-Pass Filter.

Soft Function Keys available include:

F3 C-MSG
Selects C-Message Weighted Bandpass Filter for Audio Test Filter.

F4 20 kHz
Selects 20 kHz Low-Pass Filter for Audio Test Filter.

F5 PG DN
Selects Page 2 of AMPS Setup Screen.

F6 RETURN
Returns Operation to AMPS Cellular Menu.

10. Power Level Ref

Mobile Phone Power Level used when Mobile Phone power readings are taken. Range is 0 to 7. Select using DATA ENTRY Keys. Press ENTER Key to complete edit.

Soft Function Keys available include:

F5 PG DN
Selects Page 2 of AMPS Setup Screen.

F6 RETURN
Returns Operation to AMPS Cellular Menu.

11. SINAD Test Ref

Selects Pass/Fail SINAD Test Reference. Range is 3 to 40 dB. Select using DATA ENTRY Keys. Press ENTER Key to complete edit.

Soft Function Keys available include:

F5 PG DN
Selects Page 2 of AMPS Setup Screen.

F6 RETURN
Returns Operation to AMPS Cellular Menu.

ITEM	DESCRIPTION

12. Customer Information

Displays Customer Information Menu. Edit Customer Information using DATA ENTRY Keys. Press ENTER Key to complete edit. Customer Information is printed out on Automatic Test Printout. Submenu Fields are as follows:

Customer Name	Customer I.D.
Manufacturer	Model
Serial Number	Type Approval
Certificate	

Soft Function Keys available at Prompt include:

F1 INFO
Accesses Customer Information Menu.

F5 PG DN
Selects Page 2 of AMPS Setup Screen.

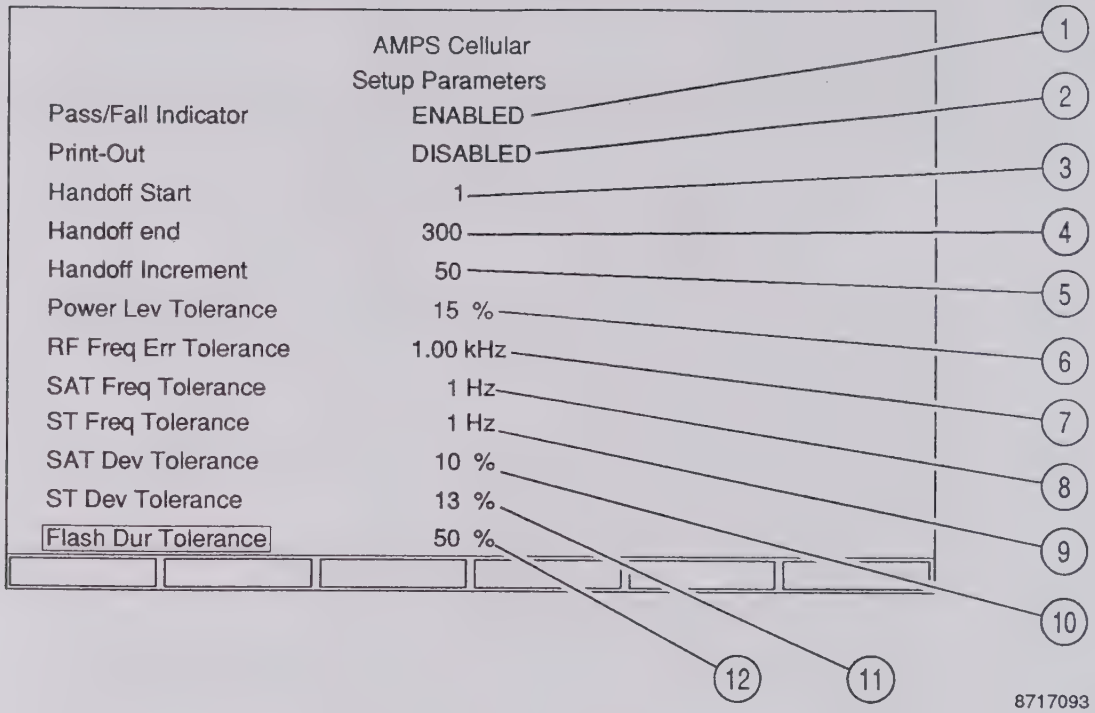
F6 RETURN
Returns Operation to AMPS Cellular Menu.

Soft Function Keys available from Customer Information Menu include:

F1 CLEAR
Clears entry in currently selected field.

F6 RETURN
Returns Operation to AMPS Setup Menu.

Pressing "Page 2" Soft Function Key F1 displays Page 2 of the AMPS Setup Menu.



ITEM	DESCRIPTION

1. Pass/Fail Indicator

   Displays status of Pass/Fail Indicator on Automatic Test Printout. Displays ENABLED or DISABLED.

   Soft Function Keys available include:

   F1 DISABLED
   Disables Pass/Fail Indicator from appearing on Automatic Test Printout.

   F2 ENABLED
   Enables Pass/Fail Indicator to appear on Automatic Test Printout.

   F5 PG UP
   Selects Page 1 of AMPS Setup Screen.

   F6 RETURN
   Returns Operation to AMPS Cellular Menu.

2. Print-Out

   Enables or disables print-out of Automatic Test Output. Requires printer connection to RS-232 Connector. Refer to Section 5 for configuring RS-232 Connector.

Soft Function Keys available include:

F1 DISABLED
Disables Automatic Test Printout.

F2 ENABLED
Enables Automatic Test Printout.

F5 PG UP
Selects Page 1 of AMPS Setup Screen.

F6 RETURN
Returns Operation to AMPS Cellular Menu.

3. Handoff Start

First channel of Handoff Test sequence. Handoff Test starts with Handoff Start channel, increases by Handoff Increment (5), performing Handoff Test at each channel and ends with Handoff End (4) channel. Range is 1 to 1023. Select using DATA ENTRY Keys. Press ENTER Key to complete edit.

Soft Function Keys available include:

F5 PG UP
Selects Page 1 of AMPS Setup Screen.

F6 RETURN
Returns Operation to AMPS Cellular Menu.

4. Handoff End

Last channel of Handoff Test sequence. Handoff Test starts with Handoff Start (3) channel, increments by the Handoff Increment (5) performing Handoff Test at each channel and ends with Handoff End channel. Range is 1 to 1023. Select using DATA ENTRY Keys. Press ENTER Key to complete edit.

Soft Function Keys available include:

F5 PG UP
Selects Page 1 of AMPS Setup Screen.

F6 RETURN
Returns Operation to AMPS Cellular Menu.

5. Handoff Increment

Increment Number for Handoff Test. Handoff Test starts with Handoff Start (3) channel, increments by Handoff Increment, performing Handoff Test at each channel and ends with the Handoff End (4) channel. Range is 1 to 1023. Select using DATA ENTRY Keys. Press ENTER Key to complete edit.

6. Power Lev Tolerance

Selects tolerance used for Power Level Test. Consists of two editable fields: Positive Tolerance and Negative Tolerance. Range for both fields is from 0% to 99% or 0 to 99 dB. For each field, select using DATA ENTRY Keys. Press ENTER Key to complete edit.

Soft Function Keys available include:

F4 dB/%
Toggles between settings. Inactive units are displayed.

F5 PG UP
Selects Page 1 of AMPS Setup Screen.

F6 RETURN
Returns Operation to AMPS Cellular Menu.

7. RF Freq Err Tolerance

Selects tolerance for RF Frequency Error measurements. Range is 0.00 to 9.99 kHz. Select using DATA ENTRY Keys. Press ENTER Key to complete edit.

Soft Function Keys available include:

F5 PG UP
Selects Page 1 of AMPS Setup Screen.

F6 RETURN
Returns Operation to AMPS Cellular Menu.

8. SAT Freq Tolerance

Selects tolerance for SAT Frequency measurements. Range is 0 to 99 Hz. Select using DATA ENTRY Keys. Press ENTER Key to complete edit.

Soft Function Keys available include:

F5 PG UP
Selects Page 1 of AMPS Setup Screen.

F6 RETURN
Returns Operation to AMPS Cellular Menu.

9. ST Freq Tolerance

Selects tolerance for Signal Tone (ST) Frequency Test. Range is 0 to 999 Hz. Select using DATA ENTRY Keys. Press ENTER Key to complete edit.

Soft Function Keys available include:

F5 PG UP
Selects Page 1 of AMPS Setup Screen.

F6 RETURN
Returns Operation to AMPS Cellular Menu.

10. SAT Dev Tolerance

Selects tolerance for SAT Deviation measurements. Range is 0% to 99%. Select using DATA ENTRY Keys. Press ENTER Key to complete edit.

Soft Function Keys available include:

F5 PG UP
Selects Page 1 of AMPS Setup Screen.

F6 RETURN
Returns Operation to AMPS Cellular Menu.

11. ST Dev Tolerance

Selects the tolerance used to determine if the Signal Tone (ST) Deviation Test passes or fails. Range is from 0% to 99%. To set, move cursor to "11. ST Dev Tolerance" and press ENTER Key. Use DATA ENTRY Keypad (29) to enter a tolerance and press ENTER Key.

Soft Function Keys available include:

F5 PG UP
Selects Page 1 of AMPS Setup Screen.

F6 RETURN
Returns Operation to AMPS Cellular Menu.

12. Flash Dur Tolerance

Selects the tolerance used to determine if the Flash Hook Duration Test passes or fails. Range is from 0% to 99%. To set, move cursor to "12. Flash Dur Tolerance" and press ENTER Key. Use DATA ENTRY Keypad (29) to enter a tolerance and press ENTER Key.

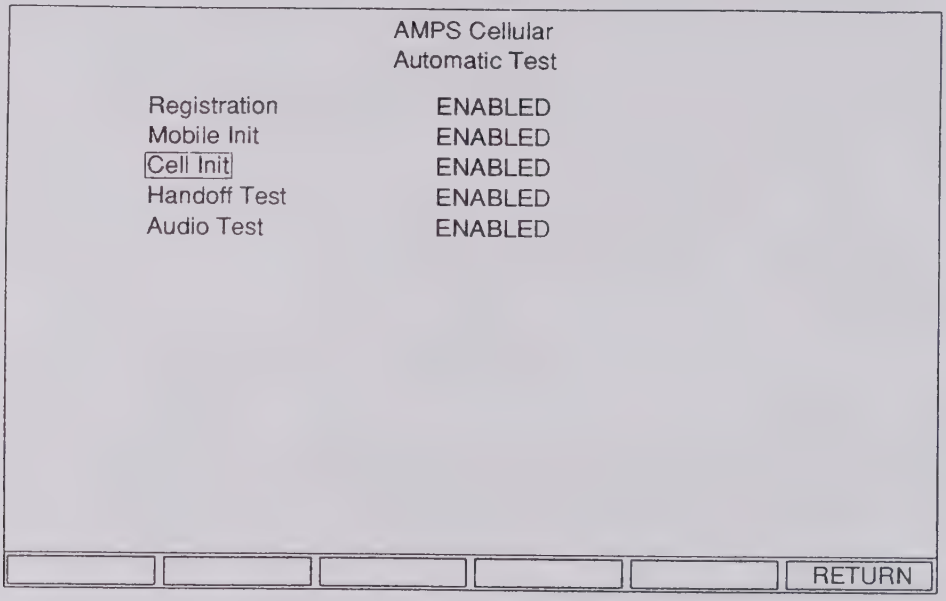
Soft Function Keys available include:

F5 PG UP
Selects Page 1 of AMPS Setup Screen.

F6 RETURN
Returns Operation to AMPS Cellular Menu.

6-13-3 AMPS CELL SITE SIMULATOR AUTOMATIC TESTS

The AMPS Automatic Test Screen is accessed by selecting "1. Automatic Test" from the AMPS Cellular Menu.



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Tests listed on the AMPS Automatic Test Screen can be performed individually or in any combination except Mobile Init or Cell Init Test must be performed if Handoff Test or Audio Test is desired. Tests to be performed are listed as ENABLED. Tests that are not to be performed are DISABLED. Each of the AMPS Automatic Test Screens are listed in the following paragraphs.

Soft Function Keys of the AMPS Automatic Test Screen prior to performing tests are as follows:

F1 DISABLED
Sets test at current cursor location to DISABLED.

F2 ENABLED
Sets test at current cursor location to ENABLED.

F3 START
Starts tests that are ENABLED.

F6 RETURN/ABORT
With RETURN displayed, returns operation to AMPS Cellular Menu. With ABORT displayed, stops current test and reports test as FAILED.

Soft Function Keys of the AMPS Automatic Test Screen after performing tests are as follows:

F1 RESET
Resets AMPS Automatic Test to initial conditions.

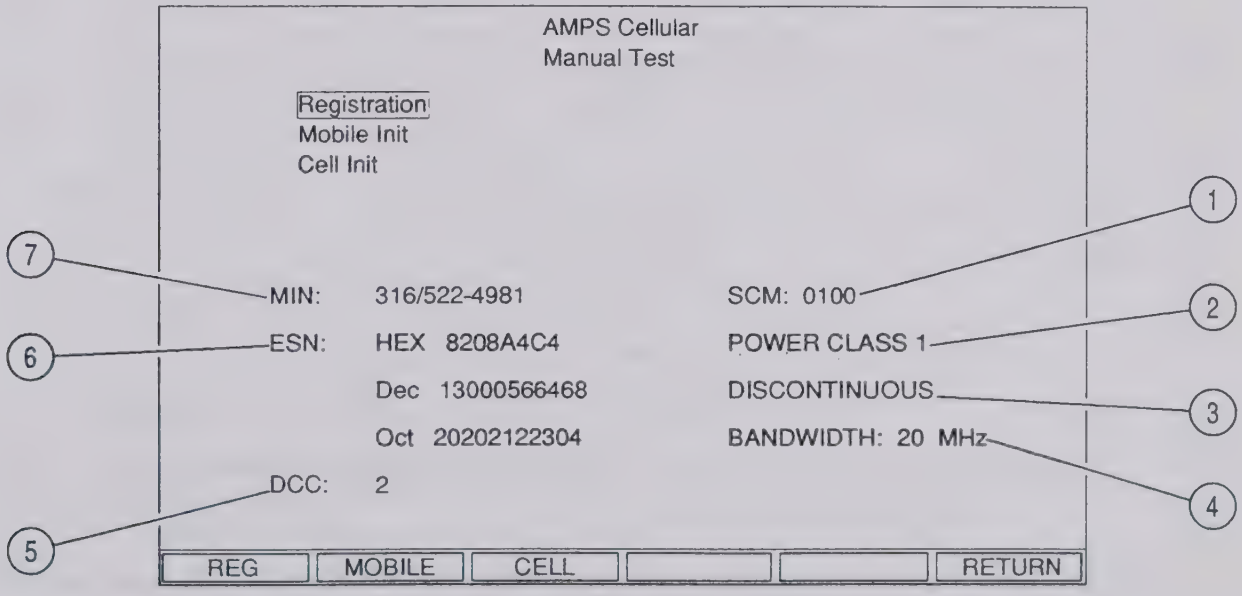
F2 RESULTS
Pages through AMPS Automatic Test results.

F3 START
Starts tests that are ENABLED.

F6 RETURN
Returns operation to AMPS Cellular Menu.

A. REGISTRATION TEST

The Registration Test sends a Registration order to the Mobile Phone and displays the registration parameters of the Mobile Phone tested. To perform the Registration Test, verify ENABLED appears beside Registration Prompt and press START Soft Function Key F3. After the Registration Tests are completed the following results appear:



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ITEM	DESCRIPTION

1. SCM

   Displays 4 least significant Station Class Mark bits.

2. Power Class

   Displays Power Class of Mobile Phone under test.

ITEM	DESCRIPTION

3. Transmission State

   Displays Transmission State, Continuous or Discontinuous, of Mobile Phone under test.

4. Bandwidth

   Displays bandwidth of Mobile Phone under test. 20 MHz allows channels 1 to 666. 25 MHz allows channels 1 to 1023.

5. DCC

   Displays Digital Color Code last received by Mobile Phone under test.

6. ESN

   Displays Electronic Serial Number of Mobile Phone under test in Hexadecimal, Decimal and Octal.

7. MIN

   Displays Mobile Identification Number of Mobile Phone under test.

B. MOBILE INIT TEST

The Mobile Init (Initiated) Test requires a call to be initiated from the Mobile Phone. The following procedure performs the Mobile Init Test:

STEP	PROCEDURE

1. With cursor on Mobile Init, press ENABLED Soft Function Key F2. Press START Soft Function Key F3 to start test.

2. "Place Call" prompt appears. Place call using Mobile Phone under test.

3. "Enter Digits" prompt appears. Enter up to 16 digits using Mobile Phone to test DTMF transmission. Pressing Cont Soft Function Key F1 continues Mobile Init Test with or without digits entered.

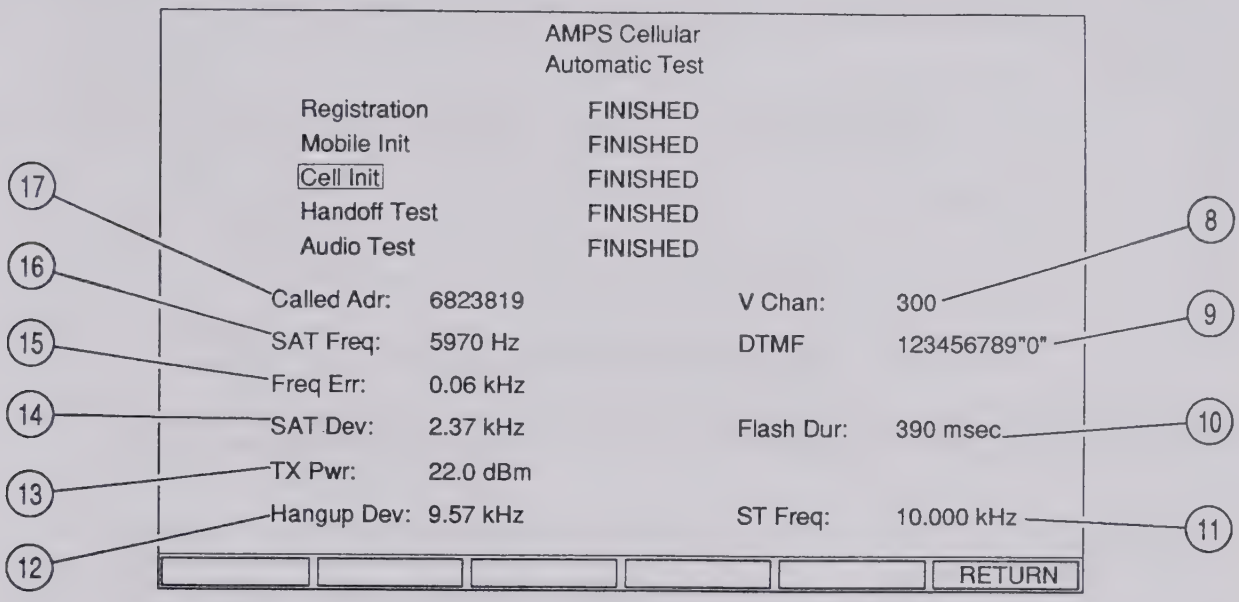
4. "Press Flash Hook" prompt appears. Send Flash Hook signal using Mobile Phone. Pressing Cont Soft Function Key F1 continues Mobile Init Test without testing Flash Hook message.

5. "Measuring Frequency" message appears indicating Maintenance Order is sent to the Mobile Phone for measuring Signal Tone frequency.

6. "Press Flash Hook" prompt appears. Send Flash Hook signal using Mobile Phone.

7. "Hangup Phone" prompt appears. Hang up Mobile Phone or press Release Soft Function Key F5 for release order to be sent to Mobile Phone. When "Hangup Phone" prompt disappears, Mobile Init Test is finished.

A Power Level Test is performed with the Mobile Init Test. After testing is finished, press Results Soft Function Key F2 to page through results. Mobile Init Test results are as follows:



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ITEM	DESCRIPTION

8. V Chan

   Displays Voice Channel designated to Mobile Phone by Test Set.

9. DTMF

   Displays DTMF digits transmitted after "ENTER DIGITS" prompt appeared.

10. Flash Dur

    Displays Flash Hook signal time duration transmitted by Mobile Phone under test.

11. ST Freq

    Displays frequency of Signal Tone transmitted by Mobile Phone under test.

12. Hangup Dev

    Displays deviation of hang up signal of Mobile Phone under test.

13. TX Pwr

    Displays Mobile Phone Output Power. Mobile Phone is set to Power Level selected as Power Level Reference in AMPS Setup Menu.

ITEM	DESCRIPTION

14. SAT Dev

    Displays deviation of SAT transmitted by Mobile Phone under test.

15. Freq Err

    Displays error of Reverse Voice Channel Frequency received from Mobile Phone.

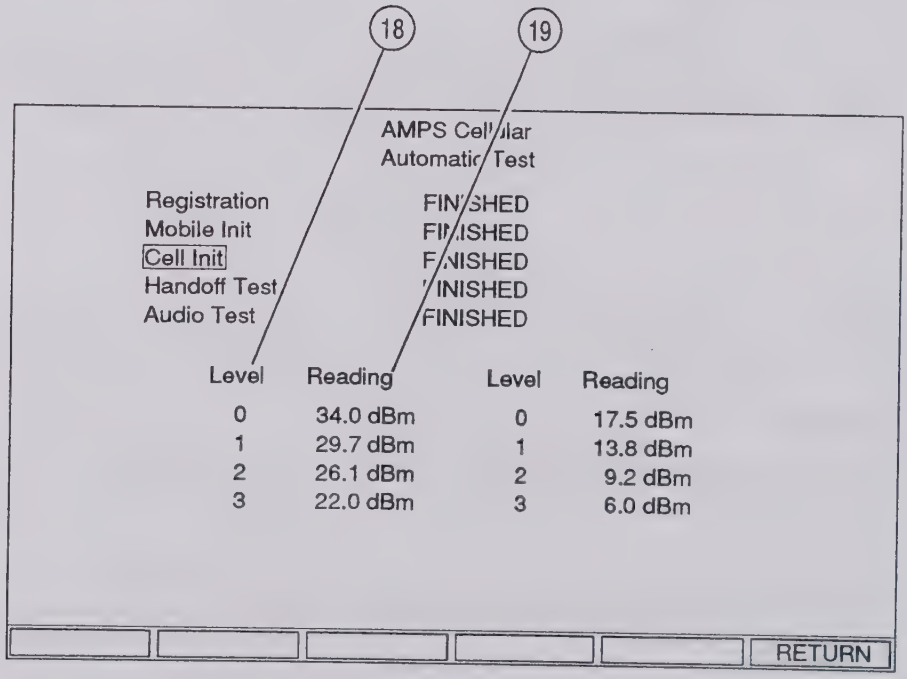
16. SAT Freq

    Displays SAT frequency transmitted by Mobile Phone under test.

17. Called Adr

    Displays phone number transmitted by Mobile Phone under test.

The Power Level Test sends the VMAC values 0 to 7 to the Mobile Phone and the output power is measured. The Power Level Test results appears as follows:



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ITEM	DESCRIPTION

18. Level

    Displays power levels of Mobile Phone.

19. Reading

    Displays power readings of Mobile Phone for each power level.

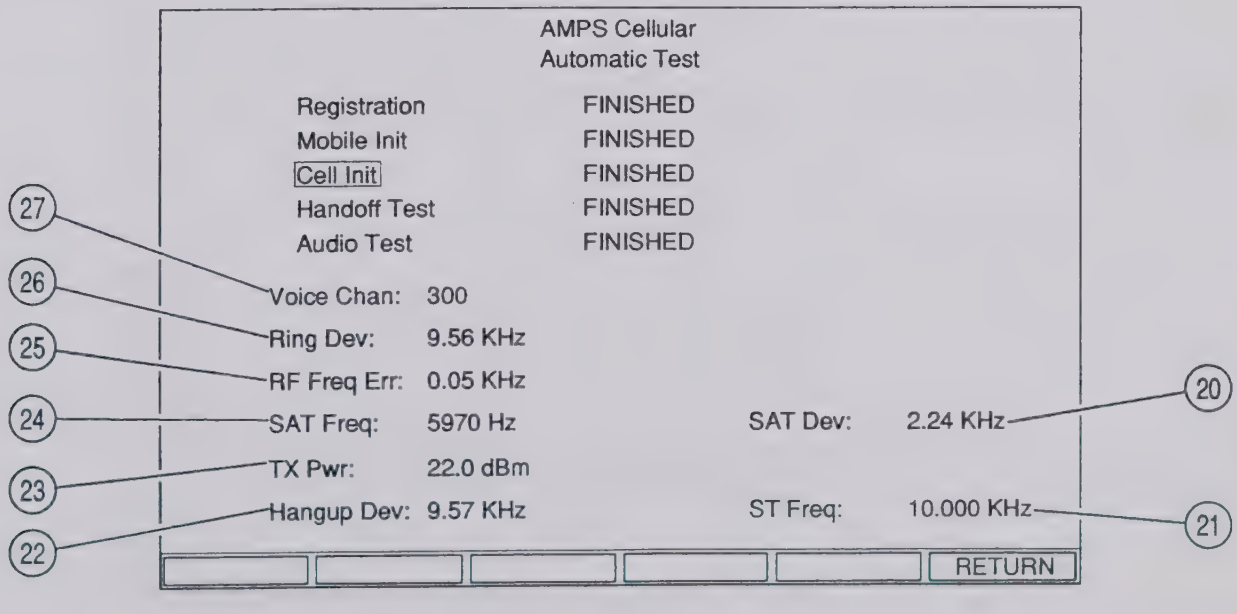
C. CELL INIT

The Cell Init (Cell Site Initiated) Test simulates a call from the Cell Site. The following procedure performs the Cell Init Test:

STEP	PROCEDURE

1. With cursor on Cell Init, press ENABLED Soft Function Key F2. Press START Soft Function Key F3 to start test.
2. "Paging Mobile", "Page Answered" and "Ringing Mobile" messages appear as Test Set performs test.
3. "Answer Mobile" prompt appears. Answer call placed to Mobile Phone.
4. "Measuring Frequency" message appears indicating Maintenance Order is sent to the Mobile Phone for measuring Signal Tone frequency.
5. If Maintenance Order does not fail, "Press Flash Hook" prompt appears. Press Flash Hook on Mobile Phone. "Hangup Phone" prompt appears. Hanging up Mobile Phone completes Cell Init Test.

A Power Level Test is also performed with the Cell Init Test. Refer to para 6-13-3B for Power Level Test information. After the Cell Init Test is finished, press "Results" Soft Function Key F2 to page through the following Cell Init Test results:



8717121

ITEM	DESCRIPTION

20. SAT Dev

Displays SAT Deviation received from Mobile Phone.

ITEM	DESCRIPTION

21. ST Freq

    Displays Signal Tone (Hang Up) Frequency received from Mobile Phone.

22. Hangup Dev

    Displays Signal Tone (Hang Up) Deviation received from Mobile Phone.

23. TX Pwr

    Displays Mobile Phone Output Power. Mobile Phone is set to Power Level selected as Power Level Reference in AMPS Setup Menu.

24. SAT Freq

    Displays SAT Frequency received from Mobile Phone.

25. RF Freq Err

    Displays error of Reverse Voice Channel Frequency received from Mobile Phone.

26. Ring Dev

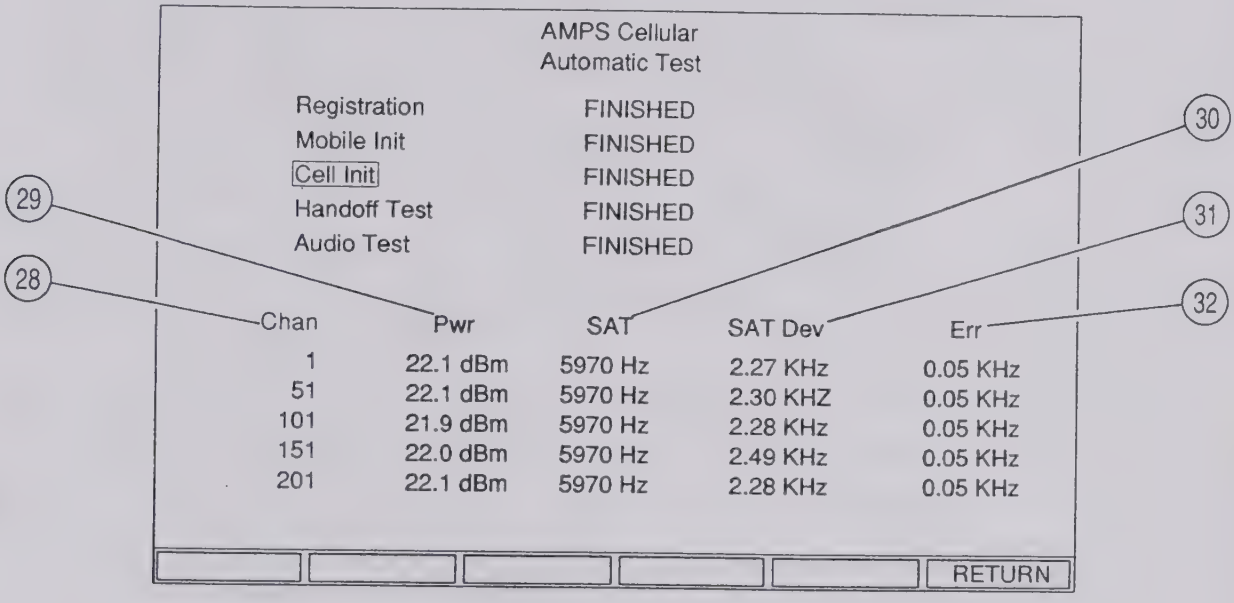
    Displays Signal Tone Deviation received from Mobile Phone in response to Page order.

27. Voice Chan

    Displays Voice Channel designated to Mobile Phone by Test Set.

D. HANDOFF TEST

The Handoff Test performs a series of handoffs to different Channels. The first handoff is to the Handoff Start Channel. Following handoffs are to the channel found by adding the Handoff Increment to the current Channel until the Handoff End Channel receives a handoff. To perform this test, press ENABLED Soft Function Key F2, while cursor is on Handoff Test. Press START Soft Function Key F3 to start test. The Handoff Test cannot be selected unless the Mobile Init Test or the Cell Init Test is selected.



8717119

ITEM	DESCRIPTION

28. Chan

Displays Voice Channel which the handoff was made.

29. Pwr

Displays Mobile Phone Output Power. Mobile Phone is set to Power Level selected as Power Level Reference in AMPS Setup Menu.

30. SAT

Displays SAT Frequency received from Mobile Phone.

31. SAT Dev

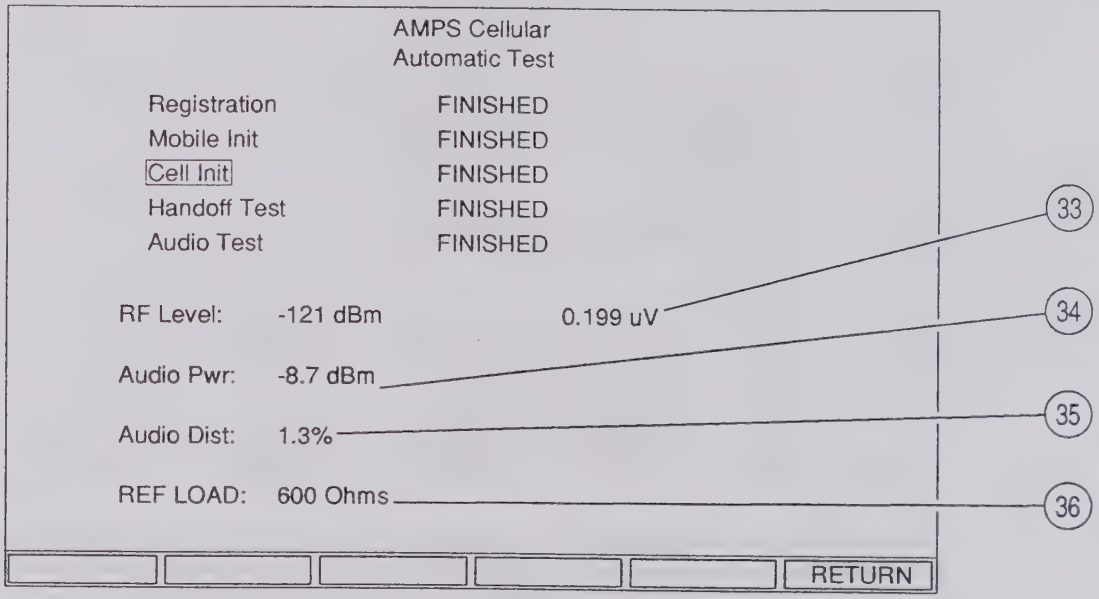
Displays SAT Deviation received from Mobile Phone.

32. Err

Displays RF Frequency Error of Reverse Voice Channel.

E. AUDIO TEST

The Audio Test measures Audio Distortion, Audio Power and RF Input Power required to maintain a SINAD Level. Requires Phone Audio Out be connected to AUDIO/DATA IN Connector. The SINAD Test Reference is set from the AMPS Setup Menu. To perform this test, press ENABLED Soft Function Key F2, while cursor is on Audio Test. Press START Soft Function Key F3 to start test. If Test is not desired, press SKIP Soft Function Key FX, when prompted by Test Set. The Audio Test cannot be performed unless the Mobile Init Test or the Cell Init Test is also performed.



8717120

ITEM	DESCRIPTION

33. RF Level

Displays RF Input Level, in dBm and volts, which produces SINAD reading equal to SINAD Test Reference.

34. Audio Pwr

Displays Mobile Phone Audio Power.

35. Audio Dist

Displays Mobile Phone Audio Distortion.

36. REF LOAD

Displays Load Reference for Audio Test.

F. AUTOMATIC TEST PRINTOUT

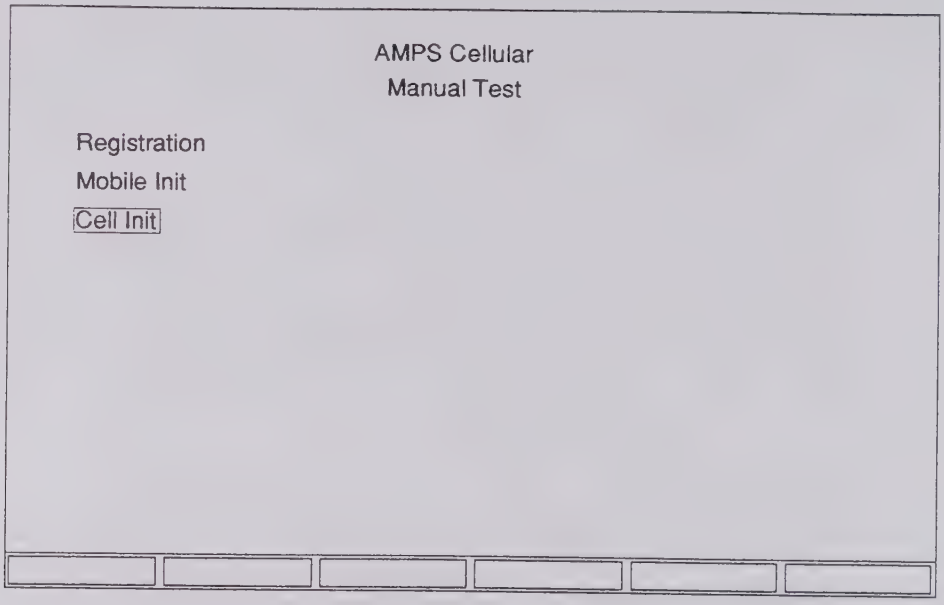
If "2. Print-Out" is enabled on Page 2 of the AMPS Setup Menu, the performed test results are printed on a device connected to the RS-232 Connector. See para 5-2 to set the RS-232 parameters. A Printout for all Automatic Tests is shown in Figure 6-1. Test readings are followed by P (Pass) or F (Fail) to indicate the test passed or failed.

```
**********************************************************************

************ IFR COM-120A AMPS CELLULAR MOBILE AUTO TEST ************
     DATE: FEB-24-1993
     CUST:                                CUST ID: 5438
     MANUFACTURER: IFR Engineering
     MODEL: Type 2                        SERIAL #: 1234567890
     TYPE APPROVAL:0987654321             CERTIFICATE: 123abc456DEF
**********************************************************************

   MOBILE ID NUMBER (MIN): 316/522-4981
   ELECTRONIC SERIAL NUMBER (ESN): HEX:  8208A4C4
                                   DEC:  13000566468
                                   OCT:  20202122304
   MOBILE STATION CLASS: 0100
                  POWER: POWER CLASS I
                  TRANSMISSION: DISCONTINUOUS
                  BANDWIDTH: 20 MHZ
   DIGITAL COLOR CODE: 3
   HOME ID (SID): 00163     HOME
   SAT: 5970 Hz
************************ MOBILE INITIATED CALL ************************
   CALLED ADDRESS: 6955895452
   VOICE CHANNEL: 300              FREQ FWD/FREQ RVS: 879.0000/834.0000
   FREQ ERROR: 0.026 kHz   P
   SAT FREQ: 5970 Hz  P             SAT DEV: 2.26 kHz   F
   MOBILE TX POWER: 5.9 dBm   P
   DTMF RESPONSE: 123456789*0#
   FLASH HOOK DURATION: 100 mS   F
************************** POWER LEVEL TEST ***************************
      LEVEL          READING
        0            33.8 dBm   P
        1            29.4 dBm   P
        2            25.8 dBm   P
        3            21.8 dBm   P
        4            17.2 dBm   P
        5            13.5 dBm   P
        6             9.1 dBm   P
        7             5.9 dBm   P
***************************** HAND-OFF TEST ***************************
      VOICE        RF          SAT          SAT          RF FREQ
     CHANNEL       PWR         FREQ      DEVIATION        ERROR
        1       5.9 dBm      5969 Hz    *2.24 kHz      0.021 kHz   F
       51       6.0 dBm      5970 Hz    *2.24 kHz      0.020 kHz   F
      101       5.5 dBm      5970 Hz    *2.22 kHz      0.020 kHz   F
      151       5.7 dBm      5970 Hz    *2.24 kHz      0.020 kHz   F
      201       6.0 dBm      5970 Hz    *2.23 kHz      0.019 kHz   F
      251       6.0 dBm      5970 Hz    *2.24 kHz      0.016 kHz   F
********************** SINAD TEST AT REF 12 dB ************************
   RF LEVEL: -119 dBm             0.250 uV
   AUDIO POWER: -54.0 dBm           REF LOAD: 600 Ohms
   AUDIO DISTORTION: 1.0 %
************************ CELL INITIATED CALL **************************
   VOICE CHANNEL: 300
   RING PLUS SAT DEVIATION: 9.48 kHz   P
   RF FREQ ERROR: 0.006 kHz   P
   SAT FREQ: 5970 Hz   P
   SAT DEV: 2.24 kHz   F
   TX POWER: 5.7 dBm   P
   HANGUP (ST) PLUS SAT DEVIATION: 9.56 kHz   P
   ST FREQUENCY: 10.000 kHz   P
```

Figure 6-1 Automatic Test Printout

6-13-4 AMPS CELL SITE SIMULATOR MANUAL TESTS

The AMPS Manual Test Screen is accessed by selecting "2. Manual Test" from the AMPS Cellular Menu.



8717091

Soft Function Keys available with the AMPS Manual Test Screen include:

F1 REG
Initiates Manual Registration Test.

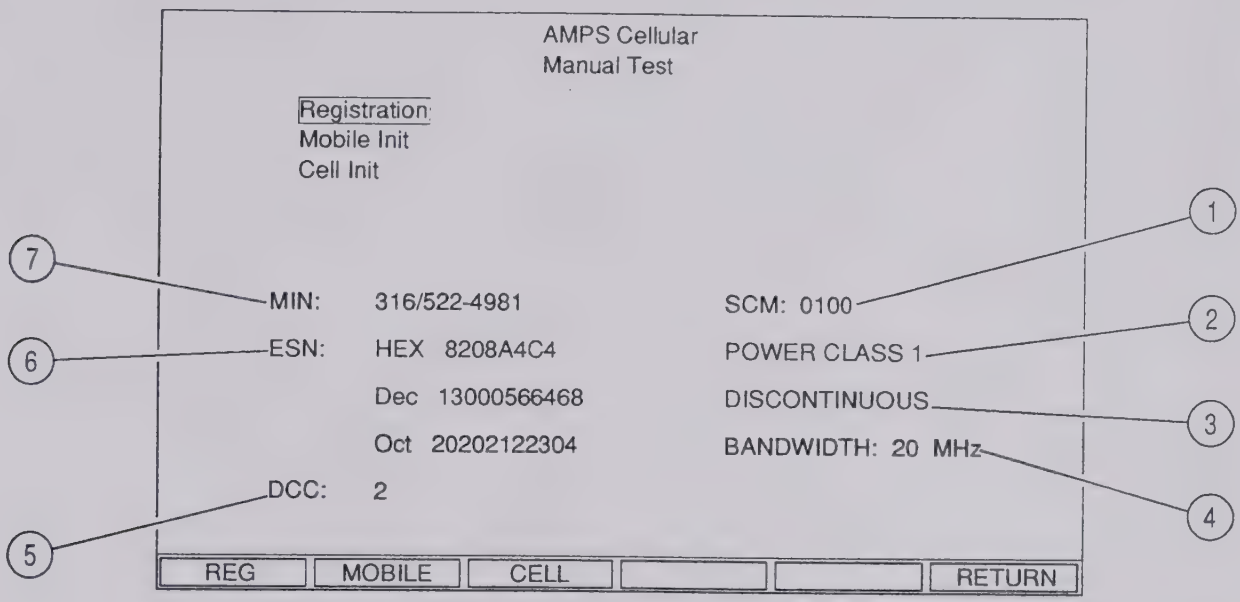
F2 MOBILE
Initiates Manual Mobile Initiated Call Test.

F3 CELL
Initiates Manual Cell Site Initiated Call Test.

F6 RETURN
Returns Operation to AMPS Cellular Menu.

A. REGISTRATION TEST

The Registration Test simulates a Registration order from the Cell Site and tests the Mobile Phone's response. To perform the Registration Test, press REG Soft Function Key F1. After the Registration Tests are completed the following results appear:



8717126

ITEM	DESCRIPTION

1. SCM

   Displays 4 least significant Station Class Mark bits.

2. Power Class

   Displays Power Class of Mobile Phone under test.

3. Transmission State

   Displays Transmission State, Continuous or Discontinuous, of Mobile Phone under test.

4. Bandwidth

   Displays bandwidth of Mobile Phone under test. 20 MHz allows channels 1 to 666. 25 MHz allows channels 1 to 1023.

5. DCC

   Displays Digital Color Code last received by Mobile Phone under test.

ITEM	DESCRIPTION

6. ESN

   Displays Electronic Serial Number of Mobile Phone under test in Hexadecimal, Decimal and Octal.

7. MIN

   Displays Mobile Identification Number of Mobile Phone under test.

Soft Function Keys available with the AMPS Manual Test Screen include:

F1 REG
Initiates Manual Registration Test.

F2 MOBILE
Initiates Manual Mobile Initiated Call Test.

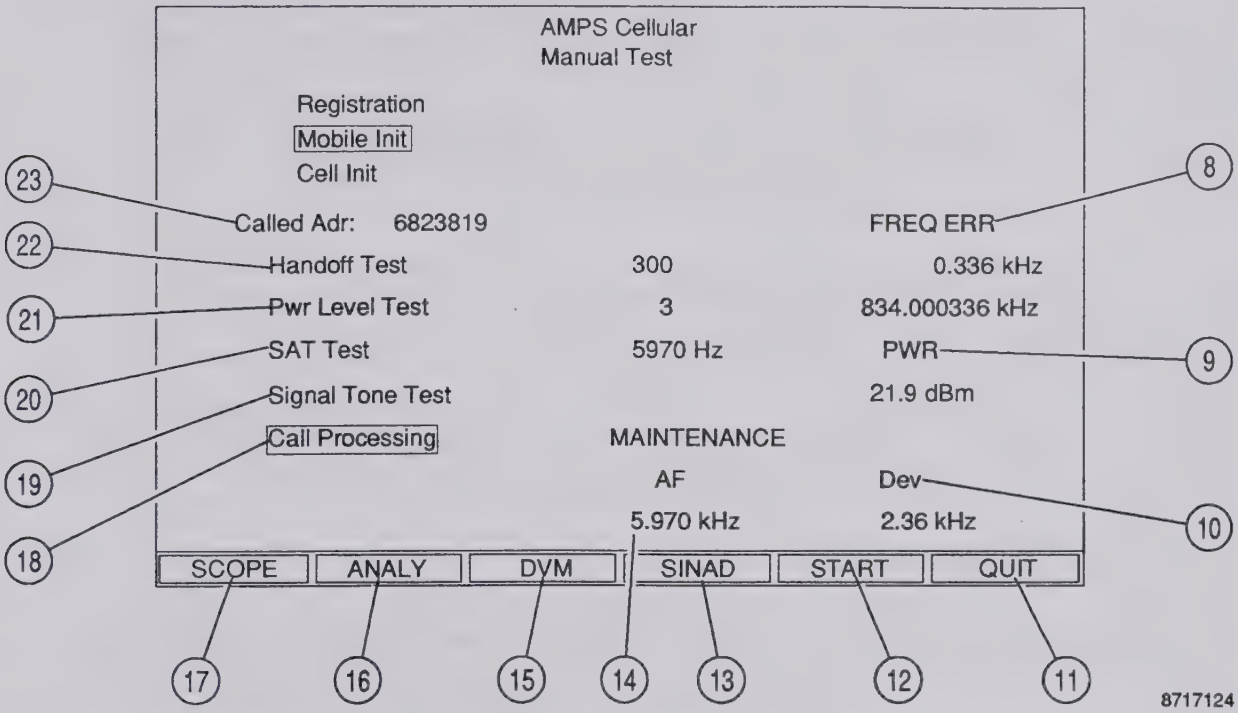
F3 CELL
Initiates Manual Cell Site Initiated Call Test.

F6 RETURN
Returns Operation to AMPS Cellular Menu.

B. MOBILE INIT TEST

The Mobile Init (Initiated) Test requires a call to be initiated from the Mobile Phone. To perform the Mobile Init Test, press MOBILE Soft Function Key F2 from AMPS Manual Test Menu. "Place Call" prompt appears. Place call using Mobile Phone under test.

Once a connection is made, the Mobile Init Screen appears containing the following data:



ITEM	DESCRIPTION

8. FREQ ERR

Displays Reverse Voice Channel Frequency and Frequency Error received from Mobile Phone.

9. PWR

Displays output power received from Mobile Phone.

10. Dev

Displays the SAT Deviation or Audio Deviation received from the Mobile Phone.

11. QUIT Soft Function Key F6

Press "QUIT" Soft Function Key F6 to exit Manual Mobile Init Screen.

12. START Soft Function Key F5

Initiates test at cursor location.

13. SINAD Soft Function Key F4

Accesses SINAD Meter for use with Cellular Testing. Refer to para 3-3-7(B) for SINAD Meter description and para 4-8-2 for SINAD Meter Operation.

14. AF

Displays SAT Frequency received from the Mobile Phone.

15. DVM Soft Function Key F3

Accesses SINAD Meter for use with Cellular Testing. Refer to para 3-3-7(C) for SINAD Meter description and para 4-8-3 for DVM Meter Operation.

16. ANALY Soft Function Key F2

Accesses Spectrum Analyzer for use with Cellular Testing. Refer to para 3-3-5 for Spectrum Analyzer Description. Refer to para 4-6 for Spectrum Analyzer Operation. Additional Field with Cellular Spectrum Analyzer is Return Cellular Field for returning to Manual Mobile Init Test Screen.

17. SCOPE Soft Function Key F1

Accesses Oscilloscope for use with Cellular Testing. Refer to para 3-3-4 for Oscilloscope Discription and para 4-5 for Oscilloscope Operation. Additions for Cellular Oscilloscope include allowing Demod Audio for input Source and Return Cellular Field for returning to Manual Mobile Init Test Screen.

18. Call Processing

Prompt for accessing Call Processing Tests. Call Processing Tests include ALERT, SEND CALLED ADDRESS, DTMF TEST, AUDIT and MAINTENANCE. Selected test is started by pressing START Soft Function Key F5.

ALERT Test is provided to observe AF (14) and Dev (11). Press START Soft Function Key F5 to initiate test. "Press Send to Clear" message is displayed. Observe AF (14) and Dev (11). Press Mobile Phone Send Key to terminate test.

SEND CALLED ADDRESS Test requires Mobile Phone to have placed phone call. Place call on Mobile Phone. Press START Soft Function Key F5.

DTMF TEST allows testing of Mobile Phone DTMF Transmission. Press START Soft Function Key F5 to initiate test. Window is displayed to enter DTMF Digits. Press keys on Mobile Phone and verify echo appears in Window. Press CLR WND Soft Function Key F5 to terminate test.

AUDIT Test exercises Audit Function of Mobile Phone. Press START Soft Function Key F5 to initiate test. Once Audit Test is complete, "Confirmation: Audit" Window is displayed.

MAINTENANCE Test is provided to observe AF (14) and Dev (11). Press START Soft Function Key F5 to initiate test. "Press Send to Clear" message is displayed. Observe AF (14) and Dev (11). Press Mobile Phone Send Key to terminate test.

19. Signal Tone Test

Signal Tone Test measures Signal Tone Frequency. Press START Soft Function Key F5 to initiate test. "Measuring Frequency" message appears indicating Maintenance Order is sent to the Mobile Phone for measuring Signal Tone frequency. Once test is complete, "Press Flash Hook" message is displayed. Press Flash Hook on Mobile Phone. "Flash Hook Detected" message is displayed. Press CLR WND Soft Function Key F5 to terminate test.

20. SAT Test

SAT Test allows change of SAT Frequency. To change SAT Frequency, press ENTER Key with cursor on SAT Test. Use DATA SCROLL Keys to select new SAT Frequency. Press ENTER Key. Verify AF (14) displays selected SAT Frequency.

21. Power Level Test

Each time a power level is entered, a VMAC message is sent to change the power level of the Mobile Phone to the level entered. To enter a power level, use DATA ENTRY Keys to enter a power level and press ENTER Key.

22. Handoff Test

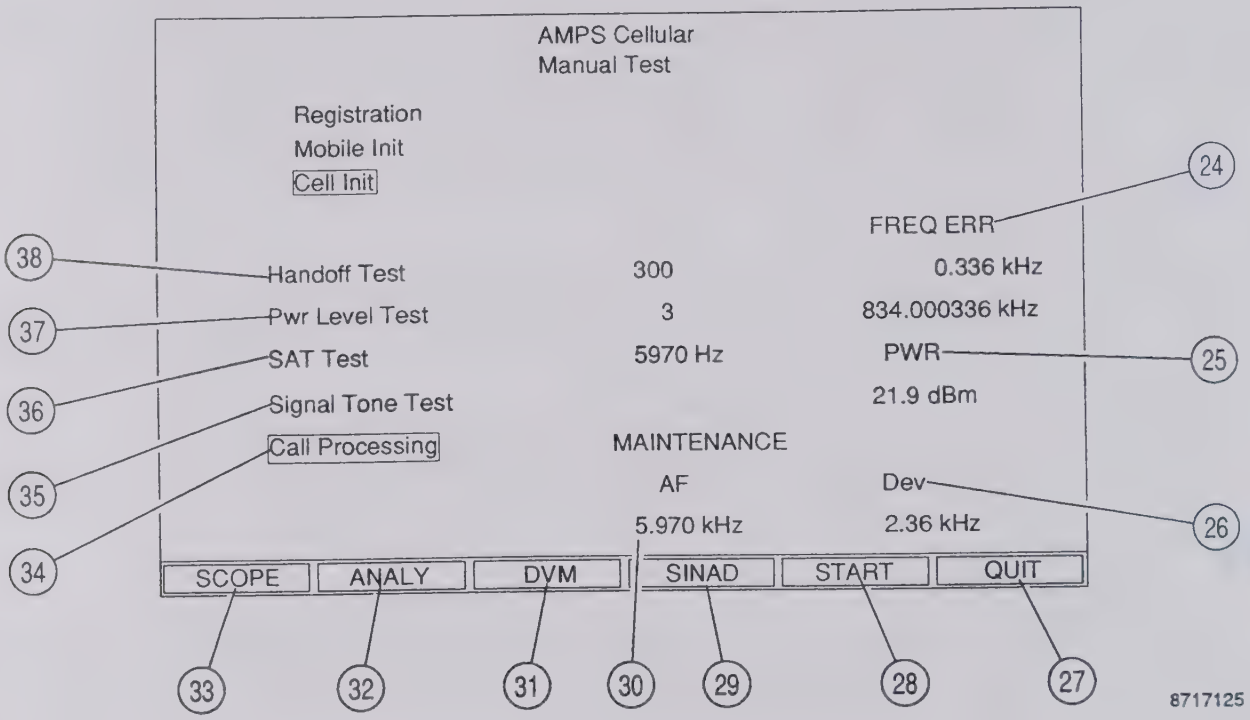
Handoff Test hands off Mobile Phone to another Cellular Channel. With cursor on Handoff Test, use DATA ENTRY Keys to select new Channel. Press ENTER Key. Verify FREQ ERR (8) changes to match new Channel.

23. Called Adr

Displays the address called by the Mobile Phone.

C. CELL INIT TEST

The Cell Init (Initiated) Test places a call to the Mobile Phone. To perform the Cell Init Test, press CELL Soft Function Key F3 from AMPS Manual Test Menu. "Paging Mobile", "Page Answered" and "Answer Phone" messages appear in order. Once "Answer Phone" message appears, answer Mobile Phone. Once a connection is made, the Cell Init Screen appears containing the following data:



ITEM	DESCRIPTION

24. FREQ ERR

Displays Reverse Voice Channel Frequency and Frequency Error received from Mobile Phone.

25 PWR

Displays output power received from Mobile Phone.

26. Dev

Displays the SAT Deviation or Audio Deviation received from the Mobile Phone.

27. QUIT Soft Function Key F6

Press "QUIT" Soft Function Key F6 to exit Manual Cell Init Screen.

ITEM	DESCRIPTION

28. START Soft Function Key F5

    Initiates test at cursor location.

29. SINAD Soft Function Key F4

    Accesses SINAD Meter for use with Cellular Testing. Refer to para 3-3-7(B) for SINAD Meter description and para 4-8-2 for SINAD Meter Operation.

30. AF

    Displays the SAT Frequency received from the Mobile Phone.

31. DVM Soft Function Key F3

    Accesses SINAD Meter for use with Cellular Testing. Refer to para 3-3-7(C) for SINAD Meter description and para 4-8-3 for DVM Meter Operation.

32. ANALY Soft Function Key F2

    Accesses Spectrum Analyzer for use with Cellular Testing. Refer to para 3-3-5 for Spectrum Analyzer Description. Refer to para 4-6 for Spectrum Analyzer Operation. Additional Field with Cellular Spectrum Analyzer is Return Cellular Field for returning to Manual Mobile Init Test Screen.

33. SCOPE Soft Function Key F1

    Accesses Oscilloscope for use with Cellular Testing. Refer to para 3-3-4 for Oscilloscope Discription and para 4-5 for Oscilloscope Operation. Additions for Cellular Oscilloscope is allowing Demod Audio for input Source and Return Cellular Field for returning to Manual Mobile Init Test Screen.

34. Call Processing

    Prompt for accessing Call Processing Tests. Call Processing Tests include ALERT, SEND CALLED ADDRESS, DTMF TEST, AUDIT and MAINTENANCE. Selected test is started by pressing START Soft Function Key F5.

    ALERT Test is provided to observe AF (14) and Dev (11). Press START Soft Function Key F5 to initiate test. "Press Send to Clear" message is displayed. Observe AF (14) and Dev (11). Press Mobile Phone Send Key to terminate test.

    SEND CALLED ADDRESS Test requires Mobile Phone to have placed phone call. Place call on Mobile Phone. Press START Soft Function Key F5.

    DTMF TEST allows testing of Mobile Phone DTMF Transmission. Press START Soft Function Key F5 to initiate test. Window is displayed to enter DTMF Digits. Press keys on Mobile Phone and verify echo appears in Window. Press CLR WND Soft Function Key F5 to terminate test.

    AUDIT Test exercises Audit Function of Mobile Phone. Press START Soft Function Key F5 to initiate test. Once Audit Test is complete, "Confirmation: Audit" Window is displayed.

MAINTENANCE Test is provided to observe AF (14) and Dev (11). Press START Soft Function Key F5 to initiate test. "Press Send to Clear" message is displayed. Observe AF (14) and Dev (11). Press Mobile Phone Send Key to terminate test.

35. Signal Tone Test

Signal Tone Test measures Signal Tone Frequency. Press START Soft Function Key F5 to initiate test. "Measuring Frequency" message appears indicating Maintenance Order is sent to the Mobile Phone for measuring Signal Tone frequency. Once test is complete, "Press Flash Hook" message is displayed. Press Flash Hook on Mobile Phone. "Flash Hook Detected" message is displayed. Press CLR WND Soft Function Key F5 to terminate test.

36. SAT Test

SAT Test allows change of SAT Frequency. To change SAT Frequency, press ENTER Key with cursor on SAT Test. Use DATA SCROLL Keys to select new SAT Frequency. Press ENTER Key. Verify AF (14) displays selected SAT Frequency.

37. Power Level Test

Each time a power level is entered, a VMAC message is sent to change the power level of the Mobile Phone to the level entered. To enter a power level, use DATA ENTRY Keys to enter a power level and press ENTER Key.

38. Handoff Test

Handoff Test hands off Mobile Phone to another Cellular Channel. With cursor on Handoff Test, use DATA ENTRY Keys to select new Channel. Press ENTER Key. Verify FREQ ERR (8) changes to match new Channel.

APPENDICES

APPENDIX A - USER I/O CONNECTORS AND PIN-OUT TABLES

A-1 TABLE OF I/O CONNECTORS

CONNECTOR NAME	CONNECTOR TYPE	SIGNAL IN/OUT	SIGNAL TYPE
T/R	"N" TYPE	IN/OUT	RF, 200 W MAX
SCOPE/DVM	BNC	IN	Analog, 200 Vdc MAX
DEMOD	BNC	OUT	Audio
AUDIO/DATA GEN	BNC	OUT	Audio
AUDIO/DATA IN	BNC	IN	Analog , Digital 30 V MAX
EXT MOD	BNC	IN	Analog, 20 V MAX
MIC/ACC	8 Pin DIN	IN/OUT	See Pin-Out (A-2)
AUX RF OUT	BNC	OUT	RF
ANTENNA	BNC	IN	RF, 10 mW MAX
AC LINE IN	AC Power In	IN	120/240 VAC
DC IN		OUT	12-30 Vdc
GPIB (IEEE-488)	24 Pin Champ	IN/OUT	See Pin-Out (A-3)
RS-232	9 Pin, D	IN/OUT	See Pin-Out (A-4)
EXTERNAL REFERENCE	BNC	IN	10 MHz >0 dB

Table A-1 Table of I/O Connectors

A-2 PIN-OUT TABLE FOR MIC/ACC CONNECTOR

Pin Number	Signal Name	Signal Type	I/O
1	PTT-Out	TTL	Programmable Out
2	Mic Audio	Audio	In
3	Demod Audio	Audio	Out
4	ACC-2	TTL	Programmable In
5	+15 Vdc	10-15 Vdc, 1 mA	Out
6	ACC-1	TTL	Programmable In
7	Mic Switch	TTL	Programmable In
8	GND		

Table A-2 Pin-Out for MIC/ACC Connector

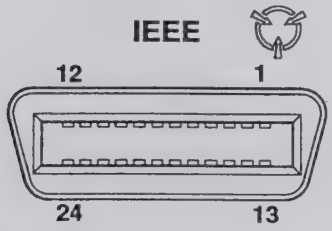
8618013

Figure A-1 MIC/ACC Connector Pin Identification

A-3 PIN-OUT TABLE FOR GPIB CONNECTOR

Pin Number	Assignment	Pin Number	Assignment
1	DIO 1	10	SRO
2	DIO 2	11	ATN
3	DIO 3	12	Digital GND
4	DIO 4	13	DIO 5
5	EOI	14	DIO 6
6	DAV	15	DIO 7
7	NFRD	16	DIO 8
8	NDAC	17	REN
9	IFC	18-24	Digital GND

Table A-3 Pin-Out for GPIB Connector



8618016

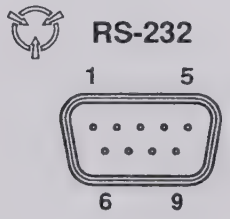
Figure A-2 GPIB Pin Identification

Use of the GPIB Connector is in compliance with ANSI/IEEE Standard 488.2-1987.

A-4 PIN-OUT FOR RS-232 CONNECTOR

Pin Number	Assignment
1	4.7 kΩ + 15Vdc
2	TX DATA
3	RX DATA
4	N/C
5	Digital GND
6	4.7 kΩ + 15Vdc
7	CTS
8	RTS
9	N/C

Table A-4 Pin-Out for RS-232 Connector



8618017

Figure A-3 RS-232 Connector Pin Identification

APPENDIX B - ABBREVIATIONS

A	
A	Ampere
ac	Alternating Current
AF	Audio Frequency
AGC	Automatic Gain Control
AM	Amplitude Modulation
amp	Ampere
ANLYZ	Analyzer
ANSI	American National Standards Institute
ANT	Antenna
AR	Autorange
ASCII	American National Standard Code for Information Interchange
Atten	Attenuation
Auto	Automatic
AUX	AUX RF OUT Connector
B	
BER	Bit Error Rate
bps	Bits per second
C	
CCH	Control Channel
ccw	Counterclockwise
C-MSG	C-Message Weighted Bandpass Filter
D	
DAC	Digital to Analog Converter
dB	Decibels
dBm	Decibels relative to 1 mW
dc	Direct Current
DCS	Digital Coded Squelch Codes
Demod Audio	Demodulated Audio
Dev	Deviation
Disp	Display
Dist	Distortion
Div	Division(s)
DPL	Duplex
DPLX	Duplex
DTMF	Dual Tone Multi-Frequency
DPLX	Duplex
DVM	Digital Voltmeter
E	
ERR	Error
ESC	Escape
ESD	Electrostatic discharge
EXT MOD	External Modulation
F	
FM	Frequency Modulation
freq	Frequency
Func	Function
Func Gen	Function Generator
G	
Gen	Generator
GND	Ground
GPIB	General Purpose Interface Bus

	H
Hz	Hertz
Hex	Hexadecimal
Horiz	Horizontal
	I
Id	Identification
IF	Intermediate Frequency
IEEE	Institute of Electrical and Electronic Engineers
in	inch
I/O	Input/Output
	K
kbps	Kilobits per second
kHz	Kilohertz (1000 Hertz)
	L
LL	Lower Limit
Lmt	Limit
	L
LB	Single Sideband Lower
lvl	Level
	M
MHz	Megahertz (1000000 Hertz)
MIC	Microphone Source
mod	Modulation
ms	Millisecond
MTRS	Meters
mV	Millivolt
mW	Milliwatt
	N
Neg	Negative
	P
para	paragraph
PH	Peak Hold
PM	Phase Modulation
Pos	Positive
	R
RCL	Recall
REC	Receiver
Recap	Recapture
	R
Ref	Reference
Res	Resolution
Ret	Return
RF	Radio Frequency
RF Pwr Lvl	RF Power Level
R freq	Receiver Frequency
RMS	Root Mean Square
Rx	Duplex Receiver (Transmitting) Frequency
	S
SCRN	Screen
sec	Second
SGL	Single
SIG	Signal Strength
SQLCH	Squelch
SSB	Single Side Band

	T
TERM	Terminal
Tone Rem	Tone Remote
Trk	Tracking
	U
UL	Upper Limit
UB	Single Sideband Upper
UUT	Unit Under Test
	V
V	Volt
VAC	Alternating current voltage
VChan	Voice Channel
Vdc	Direct current voltage
Vert	Vertical
Vp	Volts Peak
Vrms	Voltage Root Mean Square
	W
W	Watt

APPENDIX C - REPACKING FOR SHIPPING

C-1 SHIPPING INFORMATION

IFR Test Sets returned to factory for calibration, service or repair must be repackaged and shipped subject to the following conditions:

C-1-1 AUTHORIZATION

Do not return any products to factory without authorization from IFR Customer Service Department.

CONTACT: IFR Systems, Inc.
Customer Service Dept.
10200 West York Street
Wichita, Kansas 67215-8935

Telephone: 800-835-2350
TWX: 910-741-6952

C-1-2 TAGGING TEST SETS

All test sets must be tagged with:

- Owner's identification and address.
- Nature of service or repair required.
- Model No. and Serial No.

C-1-3 SHIPPING CONTAINERS

Test Sets must be repackaged in original shipping containers using IFR packing materials. If original shipping containers and materials are not available, contact IFR Customer Service Department for shipping instructions.

C-1-4 FREIGHT COSTS

All freight costs on non-warranty shipments are assumed by the customer. (See "Warranty Packet" for freight charge policy on warranty claims.)

C-2 REPACKING PROCEDURE (Figure C-1)

- Make sure bottom packing mold is seated on floor of shipping container.
- Adjust handle to lay unlocked against Test Set as shown.
- Place Elastic Retainer around Test Set to secure handle.
- Carefully wrap Test Set with polyethylene sheeting.
- Place Test Set into shipping container, making sure Test Set is securely seated in bottom packing mold.
- Place top packing mold over top of Test Set and press down until mold rests solidly on bottom packing mold.

- Close shipping container lids and seal with shipping tape or an industrial stapler. Tie all sides of container with break resistant rope, twine or equivalent.

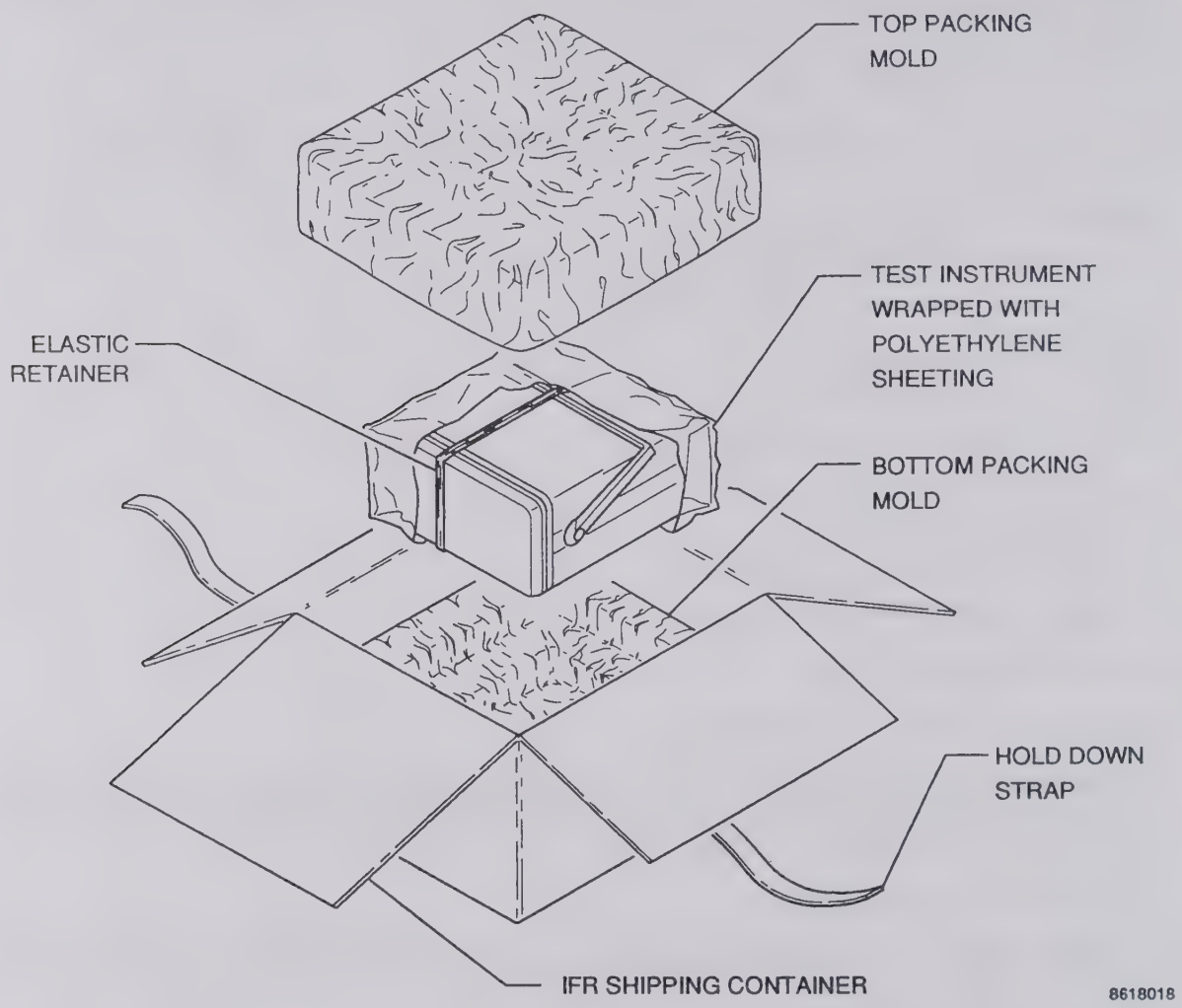


Figure C-1 Repacking for Shipment

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TO: HOLDERS OF COM-120A OPERATION MANUAL (1002-8700-100)

The pages contained in Revision 1 are listed below. Please remove and insert the affected pages in the COM-120A Operation Manual.

REMOVE PAGES	INSERT PAGES
List of Effective Pages, Page A/B	List of Effective Pages, Page A/B
Page vi/vii	Page vi/ vii
Page 6-19/6-20	Pages 6-19 through 6-20l
Page Index-1/Index-2	Index-1/Index-2

LIST OF EFFECTIVE PAGES

The manual pages listed below which are affected by a current change or revision, are so identified by a revision number

Date of issue for original and changed pages are:

Original	0	March 1, 1993
Revision 1	1	May 16, 1994

TOTAL NUMBER OF PAGES IN THIS MANUAL IS 550 CONSISTING OF THE FOLLOWING:

Pg. No.	Revision No.
Title	0
Copyright	0
Warning	0
Caution	0
Safety	0
Safety (Power Supply)	0
A	1
B Blank	0
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vi through vii	1
viii though ix	0
x Blank	0
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3-2 through 3-175	0
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3-186 Blank	0
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3-230 Blank	0
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6-8 RCC SIGNALING FORMATS (OPTION 09)

Activates encode capabilities for 10 PS, 20 PS, MTS, IMTS and Tone Remote Control Signaling Formats. These formats appear as selections for GEN1 RF Generate Modulation Source, GEN1 Duplex Generate Modulation Source and Audio Function Generator 1. While these selections appear whether or not Option 9 is installed, they are not active. Accessing these selections is discussed in Section 3-3, Operation Screens and Menus.

6-9 AUDIO/DIGITAL SIGNALING FORMATS (OPTION 11)

Provides encode/decode capabilities for both analog and digital signaling formats. Analog formats supported by Option 11 include:

CCIR	CCIRH	CCIRH4
EEA	EIA	NATEL
ZVEI	DZVEI	DDZVEI
EURO	5/6 Tone	

Listed below are the Frequencies and duration for each of the Audio Signaling Formats:

Tone Number	Code Digit	CCIR	CCIRH	CCIRH4	EEA	EIA	NATEL	ZVEI	DZVEI	DDZVEI	EURO	5/6 Tone
Tone 0	0	1981	1981	1981	1981	600	1633	2400	2200	2400	979.8	600
Tone 1	1	1124	1124	1124	1124	741	631	1060	970	1060	903.1	741
Tone 2	2	1197	1197	1197	1197	882	697	1160	1060	1160	832.5	882
Tone 3	3	1275	1275	1275	1275	1023	770	1270	1160	1270	767.4	1023
Tone 4	4	1358	1358	1358	1358	1164	852	1400	1270	1400	707.4	1164
Tone 5	5	1446	1446	1446	1446	1305	941	1530	1400	1530	652.0	1305
Tone 6	6	1540	1540	1540	1540	1446	1040	1670	1530	1670	601.0	1446
Tone 7	7	1640	1640	1640	1640	1587	1209	1830	1670	1830	554.0	1587
Tone 8	8	1747	1747	1747	1747	1728	1336	2000	1830	2000	510.7	1728
Tone 9	9	1860	1860	1860	1860	1869	1477	2200	2000	2200	470.8	1869
Repeat Tone	R	2110	2110	2110	2110	459	1805	2600	2400	970	1062.9	459
Group Tone	G	2400	2400	2400	1055	2010	1995	2800	885	885		2010
Alarm Tone	A				2400							
Tone Width (ms)		100	20	40	40	33	70	70	70	70	100	33/52

Digital formats supported by Option 11 include:

POCSAG POCSAG/ (POCSAG INVERTED)

Encoding of the analog formats is available in RF Generate, Duplex Generate and Audio/Data/Signaling Generators Operation Screens. In the RF Generate and Duplex Generate Operation Screens, these formats are accessed by selecting GEN1 (Audio Generator 1) as a modulation source. In the Audio/Data/Signaling Generators Operation Screen, these formats are accessed through Audio Generator 1. Refer to Section 3-3, Operation Screens and Menus for information on selecting these formats.

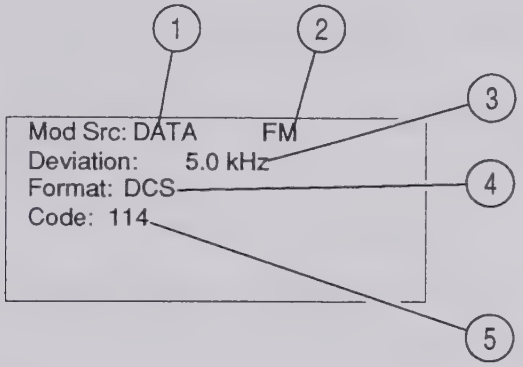
Decoding of the analog formats is available in RF Receive and Duplex Receive Operation Screens. Select the desired signaling format for decoding at the Tone/Data Code Field. Refer to Section 3-3, Operation Screens and Menus for information on selecting these formats.

For information on Digital Signaling Formats refer to the following paragraphs:

Para	Title	Page
6-9-1	Modulating RF Signals With Digital Signaling Formats	6-20a
6-9-2	Encoding Digital Signaling Formats for Audio Signal	6-20d
6-9-3	Decoding Digital Signaling Formats	6-20g
6-9-4	Testing A Receiver using Digital Signaling Formats	6-20i
6-9-5	Testing A Transmitter using Digital Signaling Formats	6-20j

6-9-1 MODULATING RF SIGNALS WITH DIGITAL SIGNALING FORMATS

Digital Signaling Formats can be used as a modulation source in both RF Generate and Duplex Generate Operation. With Option 11 installed, optional Digital Signaling Formats are accessed by selecting the DATA Generator as the Modulation Source. Additional Formats available with this option include POCSAG and POCSAG Inverted (POCSAG/). DATA Modulation Source Block is defined as follows:



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ITEM	DESCRIPTION

1. Modulation Source

   Displays selected Modulation Source. Selections include GEN1 (Audio Generator 1), GEN2 (Audio Generator 2), DTMF (DTMF Tone Generator), DATA (DATA Generator), EXT (External Modulation) and MIC (Microphone Modulation).

   Soft Function Keys available with this field include:

   F1 GEN1
   Accesses Audio Generator 1 parameters.

   F2 GEN2
   Accesses Audio Generator 2 parameters.

   F3 DATA
   Accesses DATA Generator parameters.

   F4 DTMF
   Accesses DTMF Generator parameters.

   F5 EXT
   Accesses External Modulation parameters.

   F6 MIC
   Accesses MIC Modulation parameters.

2. Modulation Type

Displays selected Modulation Type. Selections include OFF, AM, FM and PM.

Soft Function Keys available with this field include:

F1 OFF
Turns Modulation Source (1) OFF.

F2 AM
Selects AM as Modulation Type for Modulation Source (1).

F3 FM
Selects FM as Modulation Type for Modulation Source (1).

F4 PM
Selects PM as Modulation Type for Modulation Source (1).

3. Deviation/Modulation Level

Displays selected Deviation in kHz if current Modulation Type (2) is FM with range from 0.0 to 100 kHz. Displays selected Percent Modulation if current Modulation Type (2) is AM with range from 0% to 100%. Displays selected Deviation in radians if current Modulation Type (2) is PM with range from 0 to 10 Radians. Field is not displayed if Modulation Type (2) is OFF.

4. Format

Displays Format type for Modulation Source (1). Selections available with DATA include DCS, DCS/ (DCS Inverted), POCSAG and POCSAG/ (POCSAG Inverted).

Soft Function Keys available with this field include:

F1 MENU
Accesses menu for selecting Format.

Soft Function Keys available with POCSAG or POCSAG/ selected include:

F4 CONFIG
Accesses Configure screen for selecting POCSAG Function, Capcode Range and Data Rate. Capcode Range values are 1 to 9999999. Start and Stop Capcode are selected. Once activated, the system generates Start Capcode message. Capcode is increased by one and message resent until Stop Capcode message is generated. Data Rates are 512, 1200 and 2400 bps. POCSAG Functions include:

Function	Description
1 BEEP	Causes pager to beep 1 time.
2 BEEP	Causes pager to beep 2 times.
3 BEEP	Causes pager to beep 3 times.
4 BEEP	Causes pager to beep 4 times.
ALPHA_NUM	Transmits 0123456789.
ALPHA_NUM UC	Transmits ABCDEFGHIJKLMNOPQRSTUVWXYZ.
ALPHA_NUM LC	Transmits abcdefghijklmnopqrstuvwxyz.
ALPHA_NUM SPEC	Transmits !"#$%&'()*+,-./:;<=>?
NUMERIC	Transmits 0123456789-][
NUMERIC SEQ	Transmits following messages in sequence: 00000, 11111, 22222, 33333, 44444, 55555, 66666 and 77777.

Soft Function Keys available include:

F1 512
Selects 512 bps Data Rate. Displayed only with cursor at Data Rate Field.

F2 1200
Selects 1200 bps Data Rate. Displayed only with cursor at Data Rate Field.

F3 2400
Selects 2400 bps Data Rate. Displayed only with cursor at Data Rate Field.

F6 RETURN
Returns unit to normal RF Generator Operation.

F6 BURST
Activates POCSAG data for one sequence.

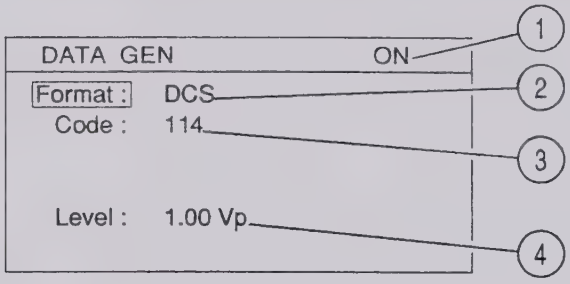
5. Code

Displays selected code for DATA Modulation Source. Not displayed with POCSAG or POCSAG/ selected as Format (4).

6-9-2 ENCODING DIGITAL SIGNALING FORMATS FOR AUDIO SIGNAL

With Option 11 installed, the DATA Generator in the Audio/Data/Signaling Generators Operation Screen has POCSAG and POCSAG Inverted (POCSAG/) Formats in addition to the DCS and DCS Inverted (DCS/) Formats contained in the standard set. Output for the DATA Generator is through the AUDIO/DATA GEN Connector. Editing the DATA Generator can be performed from the Audio/Data/Signaling Operation Screen, from the RF Receive Operation Screen, or from the Duplex Receive Operation Screen.

Functions and parameters for the DATA Generator with Option 11 installed are as follows:



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ITEM	DESCRIPTION

1. DATA Generator Prompt

   Activates selected Generator Source. Selections include GEN1 (Audio Generator 1), GEN2 (Audio Generator 2), DTMF (DTMF Tone Generator) and DATA (DATA Generator).

   Soft Function Keys available include:

   F1 GEN1
   Toggles Audio Generator 1 ON and OFF.

   F2 GEN2
   Toggles Audio Generator 2 ON and OFF.

   F3 DATA
   Toggles DATA Generator ON and OFF.

   F4 DTMF
   Toggles DTMF Generator ON and OFF.

2. Format

Displays Format type for DATA Generator. Selections include DCS, DCS/ (DCS Inverted), POCSAG and POCSAG/ (POCSAG Inverted).

Soft Function Keys available with this field include:

F1 DCS
Selects DCS as Format type. Activates CODE Field.

F2 DCS/
Selects Inverted DCS as Format type. Activates CODE Field.

F3 POCSAG
Selects POCSAG as Format type.

F4 POCSAG/
Selects Inverted POCSAG as Format type.

Soft Function Keys available with POCSAG or POCSAG/ selected as Format include:

F5 CONFIG
Accesses Configure screen for selecting POCSAG Function, Capcode Range and Data Rate. Capcode Range available is 1 to 9999999. Start and Stop Capcode are selected. Once activated, the system generates Start Capcode message. Capcode is increased by one and message resent until Stop Capcode message is generated. Data Rates available are 512, 1200 and 2400 bps. POCSAG Functions include:

Function	Description
1 BEEP	Causes pager to beep 1 time.
2 BEEP	Causes pager to beep 2 times.
3 BEEP	Causes pager to beep 3 times.
4 BEEP	Causes pager to beep 4 times.
ALPHA_NUM	Transmits 0123456789.
ALPHA_NUM UC	Transmits ABCDEFGHIJKLMNOPQRSTUVWXYZ.
ALPHA_NUM LC	Transmits abcdefghijklmnopqrstuvwxyz.
ALPHA_NUM SPEC	Transmits !"#$%&'()*+,-./:;<=>?
NUMERIC	Transmits 0123456789-][
NUMERIC SEQ	Transmits the following messages in sequence: 00000, 11111, 22222, 33333, 44444, 55555, 66666 and 77777.

Soft Function Keys available with this field include:

F1 512
Selects 512 bps Data Rate. Displayed only with cursor at Data Rate Field.

F2 1200
Selects 1200 bps Data Rate. Displayed only with cursor at Data Rate Field.

F3 2400
Selects 2400 bps Data Rate. Displayed only with cursor at Data Rate Field.

F6 RETURN
Returns unit to normal RF Generator Operation.

F6 BURST
Activates POCSAG data for one sequence.

3. Code

Displays selected code for DATA Generator. Not displayed with POCSAG or POCSAG/ selected as Format (2).

4. Level

Displays selected Level of DATA Generator. Selections range from 0 to 2.5 Vp in X1 (times 1) Mode and 0 to 25.0 mVp in /100 (divide by 100) Mode.

Soft Function Keys available include:

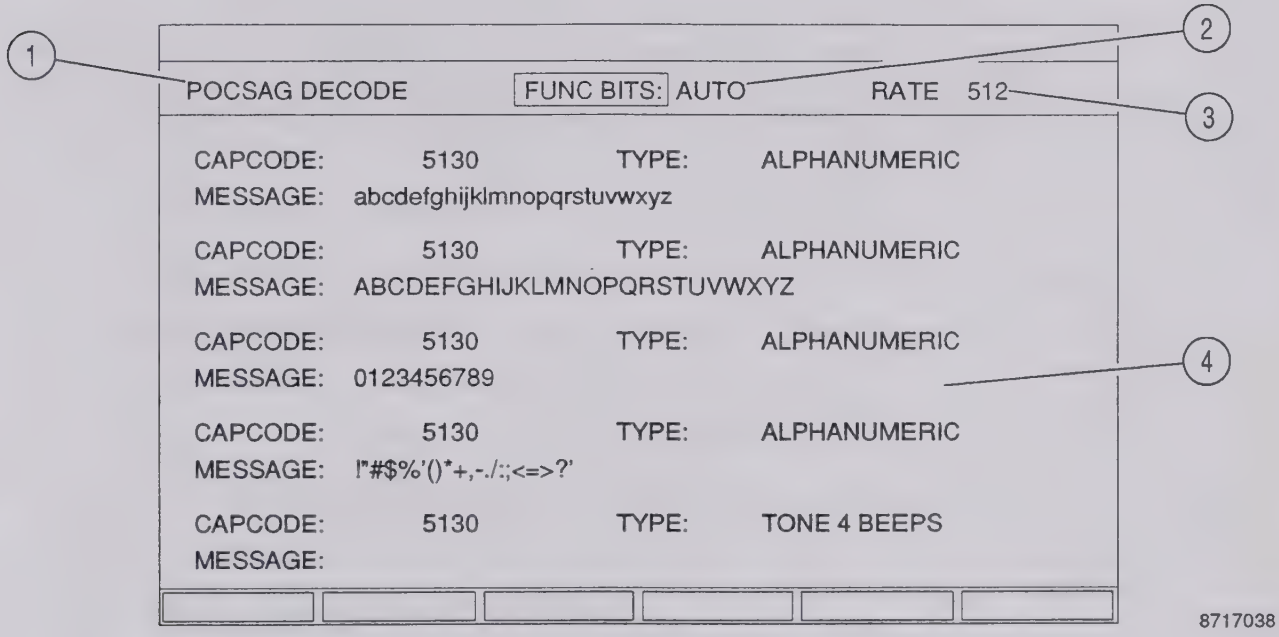
F1 X1
Activates X1 Mode for Level.

F2 /100
Activates /100 Mode for Level.

6-9-3 DECODING DIGITAL SIGNALING FORMATS

With Option 11 installed, the RF Receive Operation Screen and the Duplex Receive Operation Screen can be configured to decode POCSAG and Inverted POCSAG signals. A specific decode screen is provided for each Digital Signaling format type.

Information provided from the Decode Screens is as follows:



ITEM	DESCRIPTION

1. Decode Screen Label

   Identifies whether Decode Screen format is POCSAG or POCSAG INV (Inverted POCSAG).

2. Function

   Allows user to set Message Type to ALPHANO (ALPHANUMERIC), NUMERIC or AUTO. ALPHANO and NUMERIC settings force Decode Function to decode message as specified type. AUTO setting allows Decode Function to determine Message Type from received data.

Soft Function Keys available with this field include:

F1 DECODE
Activates Decode Function. Field is highlighted when active.

F2 STOP
Stops Decode Function.

F5 AUTOCL
Toggles Auto-Clear Function On and Off. Decode Screen (4) holds five messages. With Auto-Clear Function active, when sixth message is received, previous five messages are erased and sixth message is displayed. Field is highlighted when Auto-Clear Function is active.

F6 RETURN
Returns to previous Operation Screen.

3. Data Rate

Displays selected Data Rate for decoding messages. Selections include 512 and 1200 bps.

Soft Function Keys available with this field include:

F1 DECODE
Activates Decode Function. Field is highlighted when active.

F2 STOP
Stops Decode Function.

F3 512
Sets Data Rate to 512 bps.

F4 1200
Sets Data Rate to 1200 bps.

F5. AUTOCL
Toggles Auto-Clear Function On and Off. Decode Screen (4) holds five messages. With Auto-Clear Function active, when sixth message is received, previous five messages are erased and sixth message is displayed. Field is highlighted when Auto-Clear Function is active.

F6 RETURN
Returns to previous Operation Screen.

4. Data Screen

Displays up to five decoded messages. Information displayed includes Capcode, Message Type and Message for each received transmission.

6-9-4 TESTING A RECEIVER USING DIGITAL SIGNALING FORMATS

This procedure is provided as an example for testing a Receiver using Digital Signaling Formats. In this procedure, an RF signal is modulated with a POCSAG message. Step by step procedures are as follows:

Step	Procedure

1. Press GEN Test Mode Key to access RF Generate Operation Screen.
2. Enter Receiver frequency in RF Field.
3. Select desired Output Connector for output of signal. If Receiver is tested with direct connection, connect Receiver Input Connector to selected Output Connector. Otherwise, connect antennas to selected Output Connector and Receiver Input Connector.
4. Set Output Level to desired level.
5. Select DATA Generator for Modulation Source
6. Set Modulation Type to ***FM***.
7. Set Deviation Level for ***4.0 kHz*** or as required.
8. Set DATA Generator Format for ***POCSAG*** or ***POCSAG/***.
9. Press ***Config*** Soft Function Key F4.
10. Set Data Rate to required setting for Receiver.
11. Set Capcode Range to Receiver Capcode.
12. Set POCSAG Function for desired test function.
13. Press ***RETURN*** Soft Function Key F6.
14. Press ***BURST*** Soft Function Key F5.
15. Verify Receiver receives signal and decodes POCSAG Message correctly.

6-9-5 TESTING A TRANSMITTER USING DIGITAL SIGNALING FORMATS

This procedure is provided as an example for testing a Transmitter using Digital Signaling Formats. In this procedure, an RF signal is received and demodulated for the POCSAG message. Step by step procedures are as follows:

Step	Procedure

1. Press REC Test Mode Key to access RF Receive Operation Screen.
2. Enter Transmitter frequency in RF Field.
3. Select desired Input Connector for input of signal. If Transmitter is tested with direct connection, connect Transmitter Output Connector to T/R Connector. Otherwise, connect antennas to ANTENNA Connector and Transmitter Output Connector.
4. Set Demodulation Type to ***FM***.
5. Set IF Bandwidth to 15 kHz.
6. Select ***DATA DEC*** as Audio Filter. Set Filter for 20 kHz Low-Pass.
7. Select ***POCSAG*** or ***POCSAG/*** for Tone/Data Type in Tone/Data Code Field.
8. With cursor on Tone/Data Code Field press ***DECODE*** Soft Function Key F2 to access Decode Screen.
9. Set Decode Function to ***ALPHANO*** for Alphanumeric decode only, ***NUMERIC*** for Numeric decode only or ***AUTO*** for automatic selection based on POCSAG Message.
10. Set Data Rate to required setting for Transmitter.
11. If use of Auto-Clear Function is required, press ***AUTOCL*** Soft Function Key F5 until highlighted.
12. Press ***DECODE*** Soft Function Key F1 to start Decode Function.
13. Verify transmitted message is decoded properly on Decode Screen. Press ***STOP*** Soft Function Key F2 at any time to stop Decode Function.

6-10 SPECTRUM ANALYZER TRACKING GENERATOR (OPTION 12)

Provides internal Tracking Generator for use with Spectrum Analyzer. A new field is displayed for turning on the Tracking Generator. Field displays OFF or Tracking Generator Level. When active, an RF signal is available at the AUX RF OUT Connector at the specified level.

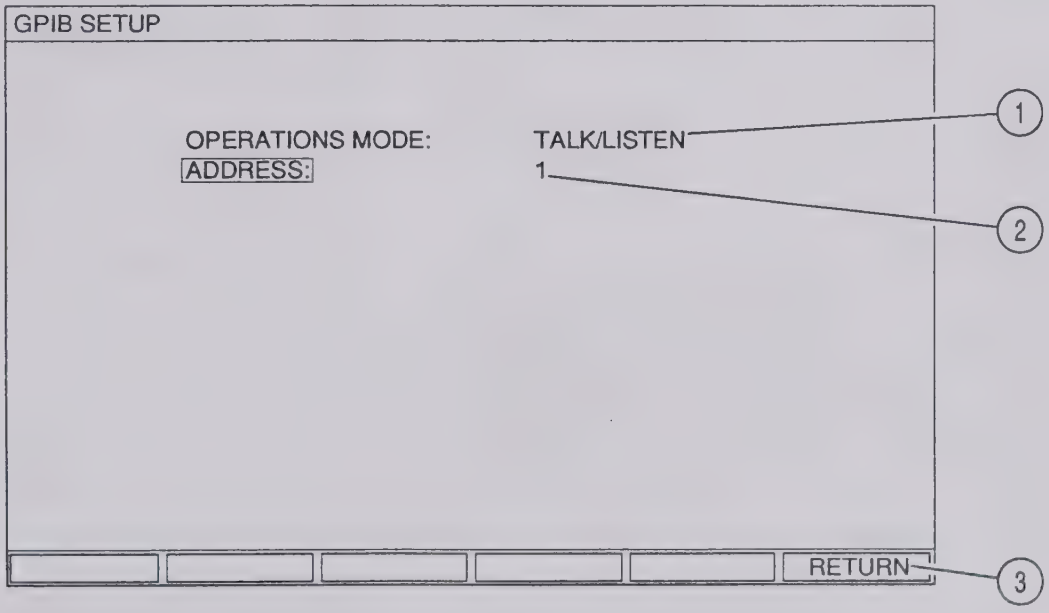
6-11 IEEE 488 (GPIB) INTERFACE (OPTION 13)

6-11-1 GENERAL

Provides parallel GPIB interface for remote operation. Refer to Section 5 for additional information on COM-120A Remote Operation and Commands listing.

6-11-2 CONFIGURING FOR REMOTE OPERATIONS USING GPIB

To access GPIB Setup Screen, Press SETUP MEMORY Key (21) and access "4. GPIB SETTINGS." Configure for GPIB Operation as follows:



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STEP	PROCEDURE

1. Select Operations Mode (1). Available selections include TALK/LISTEN, TALK ONLY and LISTEN ONLY.
2. Select GPIB Address (2). Selections range from 1 to 30.
3. Set RCI Control to ***ON*** (para 5-2, Step 11).

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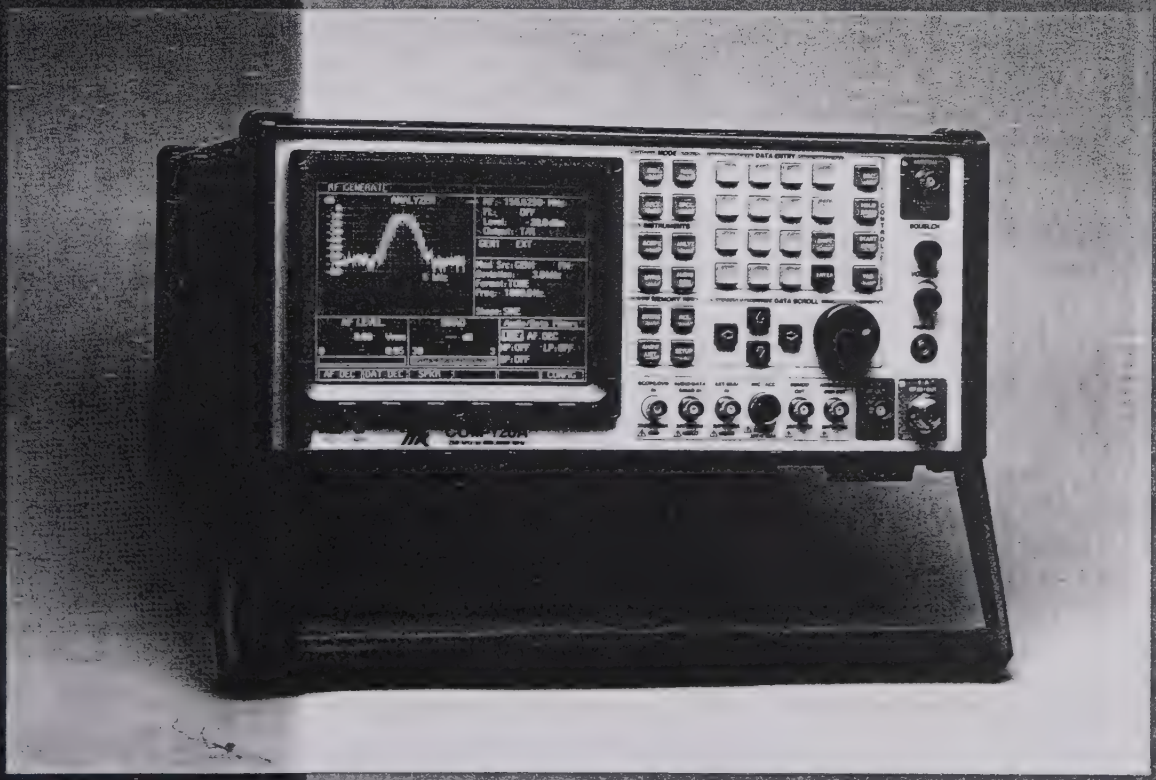
COM-120A
TRANSCEIVER TEST SOFTWARE



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IFR Systems, Inc.
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FAX #:_____

Model:_____

Serial #:_____

Version:_____

Product Enhancements/Comments:_____

_____

_____

Signature:_____ Date: _____

AC1016

EASYCOM-PC

USERS GUIDE

Application Software for the COM-120A
testing Land Mobile Transceivers

10200 West York Wichita, KS 67215 U.S.A.
(316) 522-4981 FAX (316) 522-1360

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SECTION 1 - OVERVIEW

1.1 EASYCOM-PC OVERVIEW

EasyCom-PC is application software package designed to test Land Mobile Transceivers using the COM-120A.

EasyCom-PC is a DOS based program that operates on a IBM compatible PC. The PC is connected to the COM-120A through the serial interface.

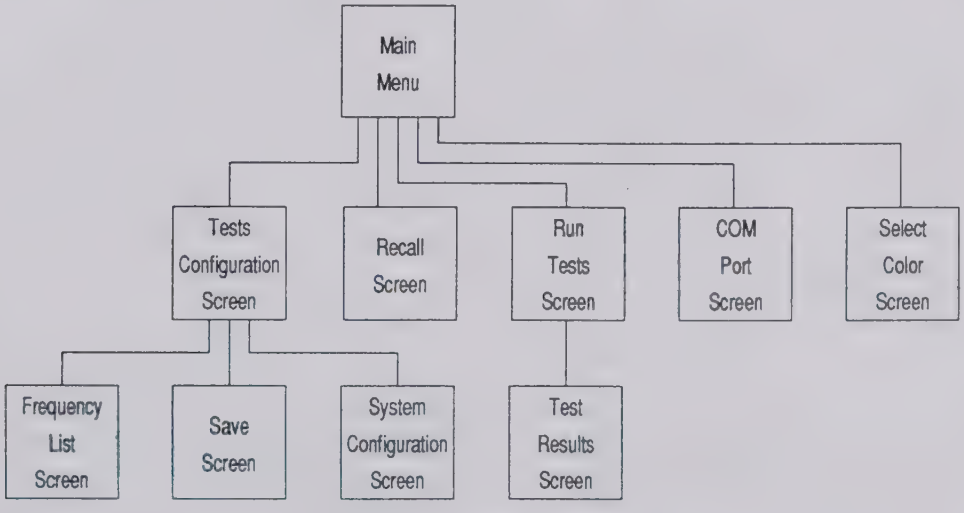
The COM-120A performs receivers tests on a Transceiver by generating the input signals needed and measuring the Transceiver's responses. The COM-120A performs transmitter tests by keying the Transceiver, applying test signals to the external modulation input of the Tranceiver and measuring the Transceiver's responses.

The EasyCom-PC Screen hierarchy is displayed below. All EasyCom-PC functions are accessed from the Main Menu.

EasyCom-PC must be configured before testing. A complete configuration contains:

- Frequency List - frequencies used for testing.
- Test selections - tests performed for each frequency.
- Test parameters - parameters used when testing and pass/fail limits for each test.
- Transceiver parameters - Transceiver characteristic parameters used during testing.

Once a configuration is entered, it can be saved and recalled when needed.



EasyCom-PC Screen Hierarchy

07D0020

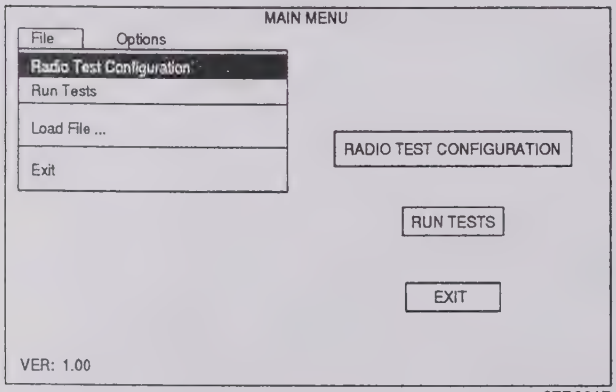
1.2 Operating Basics

EasyCom-PC can be operated with or without a mouse. Mouse operation is as simple as selecting the items available by positioning the mouse pointer and clicking the mouse.

If a mouse is not available, the Tab key moves the cursor to the next item. The Shift key and Tab key pressed at the same time moves the cursor to the previous item.

Arrow keys are used to move the cursor inside a box and Enter or the space bar is used to select items.

Pressing the Alt key highlights the top Menu Bar. Use the arrow keys to select a menu and an option on the menu. Press Enter to activate the option.



07D0017

1.3 Installation

To install EasyCom-PC, insert the EasyCom-PC source disk into the PC and change the current drive to the drive containing the source disk. Type Setup to start the setup program. Follow the directions of the setup program to complete the installation of EasyCom-PC.

1.4 Requirements

EasyCom-PC resides and operates in an IBM compatible PC. EasyCom-PC's minimum system requirements are: 80286, 640k RAM and DOS 3.0. A COM-120A with firmware version 1.05 or greater is recommended.

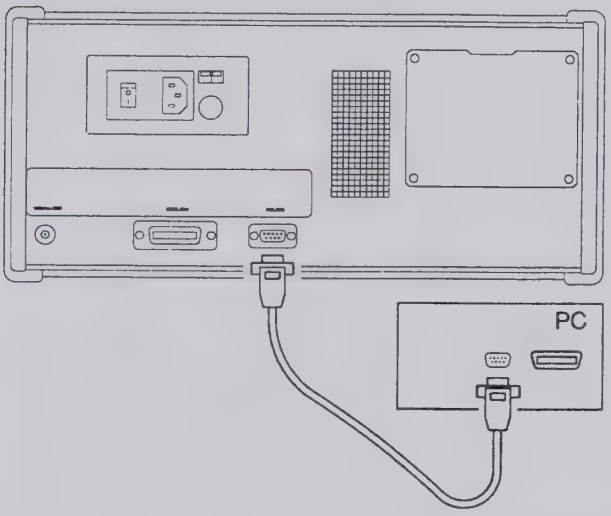
SECTION 2 - OPERATION

2.1 STARTING EASYCOM-PC

EasyCom-PC operates on a IBM compatible PC. EasyCom-PC controls the COM-120A through the PC's RS-232 interface.

To start EasyCom-PC:

1. Connect an RS-232 cable from COM1 or COM2 of the PC to the RS-232 Connector of the COM-120A.



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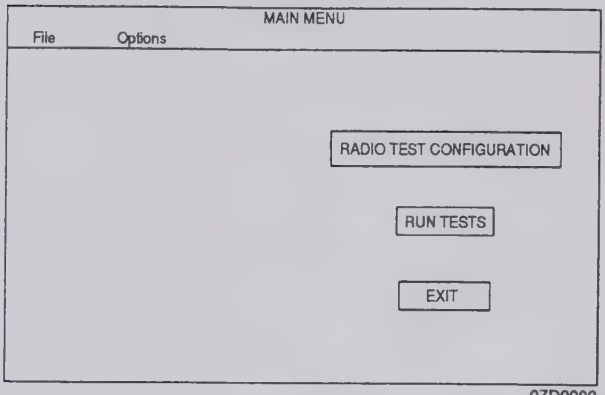
2. Set the COM-120A RS-232 parameters to the following settings:

Operation Mode	Host
Baud	9600
Data Bits	8
Stop Bits	1
Parity	None
Handshake	CTS/RTS
RCI Echo	OFF
RCI Control	Enabled
Handshake Off Threshold	25
Handshake On Threshold	25

3. Change the current directory to the directory containing EasyCom-PC. Type *EASYCOM* and press Enter. The Main Menu appears:



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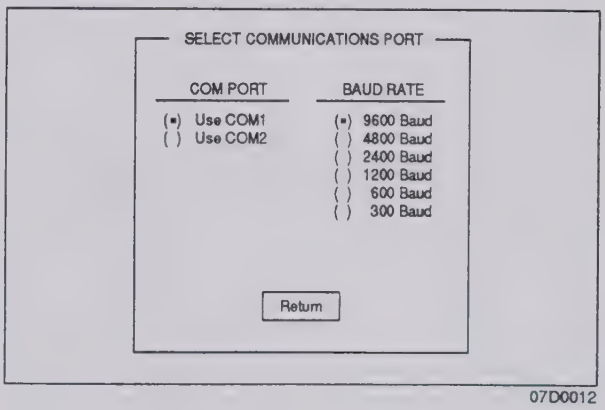
4. Press the Alt key. Type *O* and *C* to display the COM Port settings:



07D0012

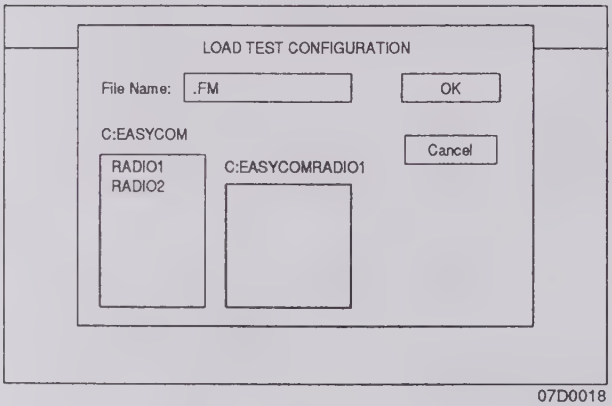
5. Select the PC COM Port connected to the Test Set. Select the baud rate the Test Set is set to. Select the Return box.

The Main Menu is again displayed on the PC.

2.2 RECALLING A SAVED CONFIGURATION

EasyCom-PC configurations can be saved and recalled to ease setup. A configuration file contains a frequency list, tests selected (and their parameters) and the transceiver characteristic parameters.

To recall a configuration, press the Alt key and type *F* from the Main Menu. Type *O* to display the Recall Screen:



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Enter the file name of the saved configuration and press Enter. The configuration is recalled and EasyCom-PC is setup with the recalled configuration.

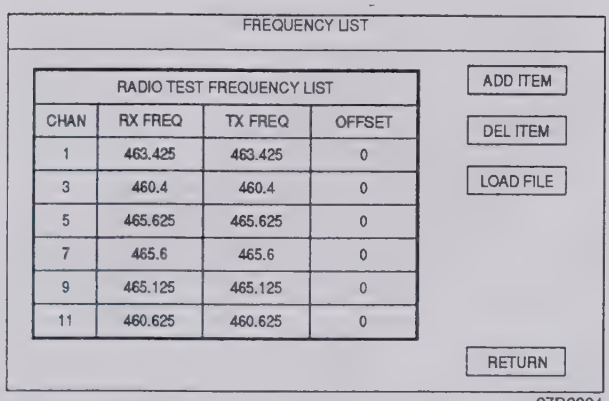
2.3 ENTERING A FREQUENCY LIST

The frequencies used to test the transceiver are entered into EasyCom-PC from the Frequency List Screen.

The Frequency List shows the RX frequencies, TX frequencies and the offset. When two of these values are entered, the third value is defaulted automatically by EasyCom-PC.

To enter frequencies:

1. Select the Radio Test Configuration box from the Main Menu. The Test Configuration Screen appears. Select the Freq List box to display the Frequency List Screen:



07D0004

2. Move the cursor to the CHAN column and enter a channel. Press Enter.

3. Enter the receive frequency in the RX FREQ column. Press Enter.

4. Enter the transmit frequency in the TX FREQ column. Press Enter.

5. Repeat steps 2 through 4 until the frequency list is entered.

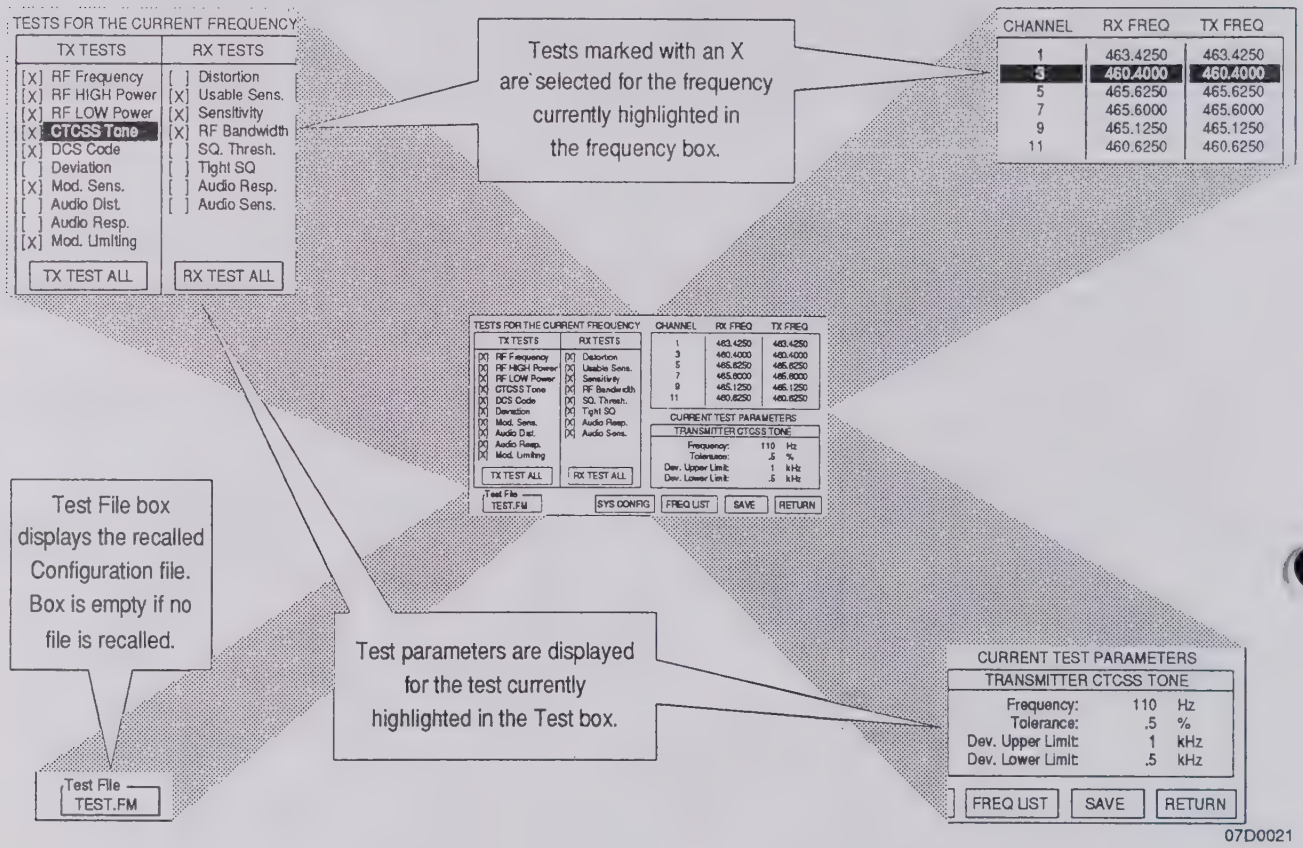
6. To insert a line into the frequency list, move the cursor to the row preceding the desired location. Select ADD ITEM to insert the new line.

7. To delete a line from the frequency list, move the cursor to the unwanted line. Select DEL ITEM.

8. When the frequency list is complete, select the Return box. The Test Configuration Screen appears.

2.4 SELECTING TESTS AND TEST PARAMETERS FOR EACH FREQUENCY

The Test Configuration Screen is used by the operator to select what tests are performed for each frequency. Any group of tests can be selected for each frequency. The parameters for each test are also selected using this screen.



To select the tests and test parameters:

1. Select a test to be performed with the currently highlighted frequency. Press the space bar to toggle a test selected or unselected.

2. Press F10 to move to the Current Test Parameters box. This box shows the parameters for the currently highlighted test. These parameters are values used in testing and limits used to determine the pass/fail status. Edit the parameters as desired. Press F9 to return the cursor to the Test Select box.

Test parameters stay constant for all frequencies except for the CTCSS Tone and DCS Code tests. CTCSS Tone and DCS Code test parameters can be set individually for each frequency.

3. Repeat steps 1 and 2 until all desired tests and test parameters are selected for the currently highlighted frequency.

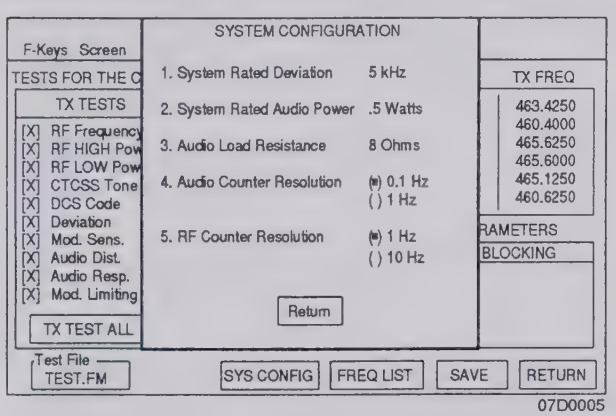
4. Press F8 to highlight the next frequency and repeat steps 1 through 3 until tests are selected for all frequencies. Pressing F7 highlights the previous frequency.

2.5 ENTERING TRANSCEIVER PARAMETERS

EasyCom-PC uses three Transceiver parameters to determine the proper audio and modulation levels during testing.

To enter these parameters:

1. Select the SYS CONFIG box from the Test Configuration Screen. The Transceiver Parameter Screen appears:



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2. Enter the Transceiver's rated deviation, Audio power and the Audio load resistance.

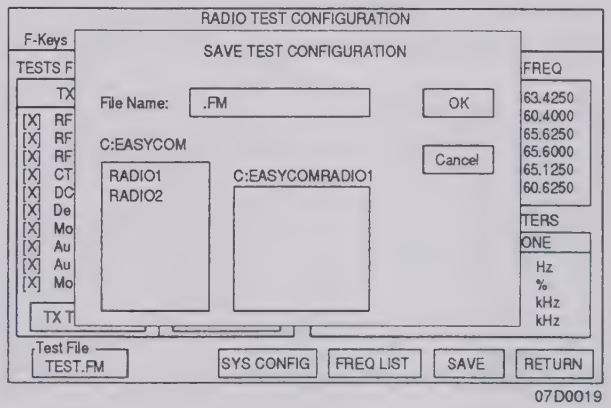
3. The Audio and RF counter resolutions refer to the resolution of the AF and RF frequency readings obtained during testing. Select the desired settings and select the Return box.

2.6 SAVING A CONFIGURATION

Once a configuration is entered, it can be saved and recalled at a later date. A saved configuration contains all the EasyCom-PC settings needed for testing. These include:

- Test selections
- Test parameters for selected tests
- Frequency List
- Transceiver characteristic parameters (System Configuration parameters)

To save a configuration, select the SAVE box from the Test Configuration Screen. The Save Screen appears:

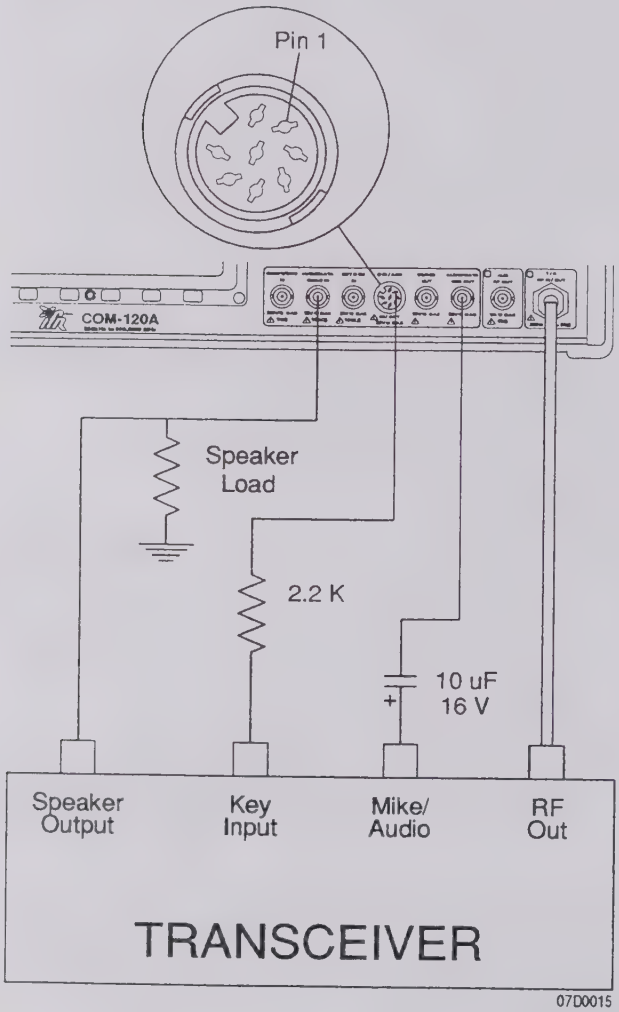


07D0019

Select the file path and enter the name of the configuration file to be saved. Press Enter to save the file and return to the previous screen.

2.7 TRANSCEIVER CONNECTIONS

To test a transceiver, it must be connected to the COM-120A. Connect the COM-120A to the Transceiver as shown.

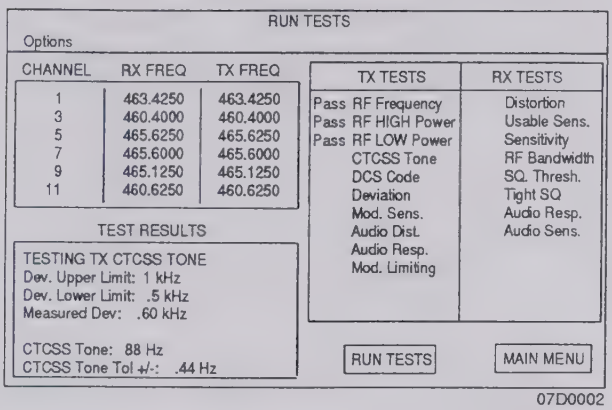


Connecting the Key Input of the Transceiver to the MIC/ACC Connector is optional. This connection automatically keys the Transceiver when needed. EasyCom-PC grounds pin 1 of the COM-120A MIC/ACC Connector when the Transceiver should be keyed during testing. Refer to paragraph A-1 in the COM-120A Operation Manual for information on the MIC/ACC Connector.

Consult the Transceiver Manufacturer's Guide for the speaker load resistance value and possible cabling differences.

2.8 TESTING TRANSCEIVERS

To test Transceivers, select the RUN TESTS box from the Main Menu. The Test Screen appears:

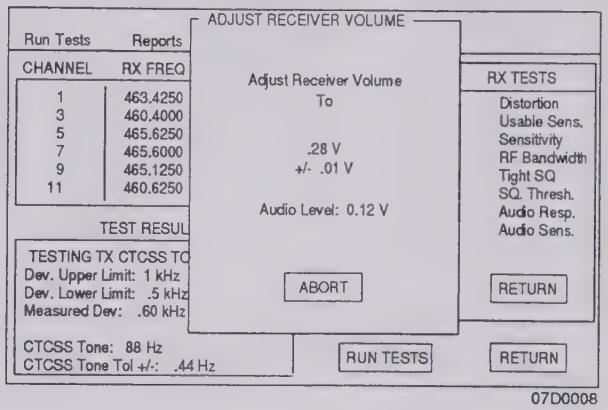


07D0002

To test each channel in the Frequency List, select the RUN ALL box.

To test part of the channels in the Frequency List, hold down the Shift Key while using the arrow keys to select any group of sequential channels. Select the RUN SELECT box.

As the Transceiver is tested, the operator is prompted to adjust the channel, squelch and volume settings of the Transceiver. When adjusting the Transceivers volume, a box appears displaying the current and desired settings:



07D0008

When the correct adjustment is made, EasyCom-PC continues with testing.

When the tests are completed, The Test Results Screen is displayed showing the test results.

2.9 VIEWING TEST RESULTS

After Transceiver tests are completed, the test results are displayed:

Display

TX TEST CHANNEL: 1 FREQUENCY: 463.425

TEST	SPECIFICATION			READING	PASS / FAIL
TX FREQUENCY	463.425 MHz			463.425 MHz	
FREQUENCY ERROR	-926.9 Hz	TO	926.9 Hz	-444 Hz	PASS
RF LOW Power	2.25 W	TO	4.5 W	3.2 W	PASS
TX LOW POWER	.4 W	TO	.7 W	.583 W	PASS
TX CTCSS TONE	109.5 Hz	TO	110.6 Hz	0 Hz	
CTCSS DEVIATION	.5 kHz	TO	1 kHz	0 kHz	** FAIL**
TX DEVIATION @ 20 mV	1 kHz	TO	4 kHz	2.29 kHz	PASS
TX MODULATION SENS.	15 mV	TO	50 mV	30 mV	PASS
TX AUDIO DISTORTION	LESS THAN		10 %	12.34 %	** FAIL**
TX AUDIO BW @ 300 Hz	-13.5 dB	TO	-9.5 dB	-11.06 dB	PASS
TX AUDIO BW @ 1000 Hz	-3 dB	TO	1 dB	0 dB	PASS
TX AUDIO BW @ 1700 Hz	1.6 dB	TO	5.6 dB	3.6 dB	PASS
TX AUDIO BW @ 2400 Hz	4.6 dB	TO	8.6 dB	6.02 dB	PASS

PRINT OUT ESCAPE

07D0006

The results are arranged by channel. The channel tested is displayed above each group of results.

Use the Page Up, Page Down and arrow keys to view the results.

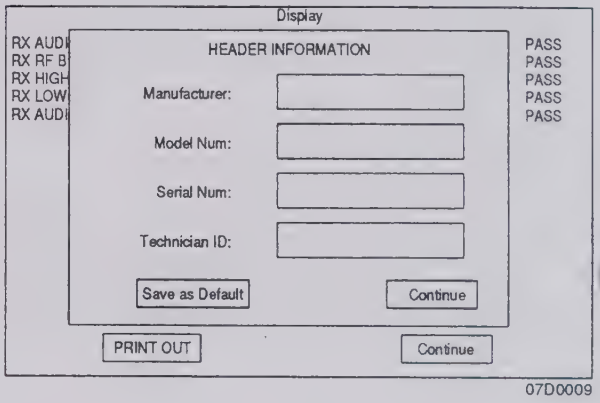
2.10 PRINTING TEST RESULTS

Once a Transceiver is tested and the test results are displayed, the test results can be printed.

To print the test results:

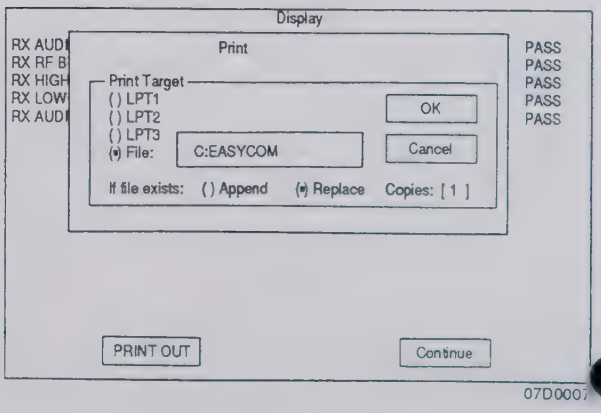
1. Connect a printer to the parallel printer port of the computer.

2. Select the PRINT box from the Test Results Screen. A screen appears allowing header information to be entered. This information is printed at the top of the test results printout.



07D0009

3. Enter the information as desired. Selecting the Save as Default box saves the entered information as the default header text. Select the Continue box when finished. The Print Screen appears:



07D0007

4. Use the arrow keys to select a printer port or select File to print the test results to a file.

5. If File is selected, enter the file's name in the caption box. Select Append or Replace. Append adds the current results to the file entered. Replace deletes the old file and prints the current results to a file of the same name.

6. Select the number of copies to print.

7. Select the OK box to print or select the Cancel box to cancel printing.

APPENDICES

APPENDIX A - TEST DEFINITIONS

TX RF Frequencies

The Test Set calculates the difference between the frequency setting and the received frequency. If the frequency error is not within specifications, the test fails.

TX RF High Power

The carrier power received from the transceiver is measured. The Operator is prompted to set the Transceiver to high power if needed. If the carrier power is not within specifications, the test fails.

TX RF Low Power

The carrier power received from the transceiver is measured. The Operator is prompted to set the Transceiver to low power if needed. If the carrier power is not within specifications, the test fails.

TX CTCSS Tone

The CTCSS Tone frequency is measured and the frequency error is determined using the test specifications entered. The CTCSS Tone deviation is measured. If the frequency error or the deviation is not within specifications, the test fails.

TX DCS Code

The Transceiver is keyed and the resulting DCS code transmission is decoded. If the decoded digits do not match the specified digits, the test fails.

TX Deviation

A 1 kHz tone is applied to the Transceiver's External Mike Input. The level of the tone is set in the test specifications. The resulting deviation is measured. If the deviation is not within specifications, the test fails.

TX Modulation Sensitivity

A 1 kHz tone is applied to the Transceiver's External Mike Input. The level of the 1 kHz tone is adjusted until the Transceiver's deviation is measured at 60% of the Transceiver's rated deviation. If the adjusted level of the 1 kHz tone is not within specifications, the test fails.

TX Audio Distortion

A 1 kHz tone is applied to the Transceiver's External Mike Input. The level of the 1 kHz tone is adjusted until the Transceiver's deviation is 60% of the Transceiver's rated deviation. The Transceiver output distortion is measured. If the distortion is not within specifications, the test fails.

TX Audio Response

A 1 kHz tone is applied to the Transceiver's External Mike Input. The level of the 1 kHz tone is adjusted until the Transceiver's deviation is 30% of the Transceiver's rated deviation. This adjusted level is used as the 0dB reference level.

The tone's frequency is changed to 300 Hz, 1.7 kHz, 2.4 kHz and 3 kHz. For each tone frequency, the tone's input level is adjusted until the Transceiver's measured deviation is 30% of the Transceiver's rated deviation. If the adjusted input levels of these tones is not within specifications of a 6 dB/octive preemphasis curve, the test fails.

TX Modulation Limiting

A 1 kHz tone is applied to the Transceiver's External Mike Input. The level of the 1 kHz tone is adjusted until the Transceiver's deviation is measured at 60% of the Transceiver's rated deviation. The Test Set's deviation meter is set to peak hold and the 1 kHz tone's level is increased 20 dB in one step. The instantaneous peak deviation is measured. If the instantaneous peak deviation measurement is not within specifications, the test fails.

The Test Set's peak hold feature is disabled, and the average deviation is measured using a 300 Hz, 1 kHz and a 3 KHz tone. If the average deviation measurements are not within specifications, the test fails.

RX Distortion

An RF signal is sent to the Transceiver at the receive frequency. The level of the RF signal is set to -60 dBm. This RF signal is modulated by a 1 kHz tone at the deviation level of 60% of the Transceiver's rated deviation.

The operator is prompted to adjust the Transceiver's volume until the audio output reaches the Transceiver's rated audio output power. The audio distortion is measured and compared to test specifications.

The operator is prompted to lower the volume setting by 17 dB. The audio distortion is measured. If either distortion measurement is not within specifications, the test fails.

RX Usable Sensitivity

An RF signal is sent to the Transceiver at the receive frequency. The level of the RF signal is set to -60 dBm. This RF signal is modulated by a 1 kHz tone at the deviation level of 60% of the Transceiver's rated deviation.

The operator is prompted to adjust the Transceiver's volume until the audio output reaches the Transceiver's rated audio output power.

The level of the RF signal is adjusted until the Transceiver's audio output reaches the specified sensitivity. If the adjusted level of the input RF signal is not within specifications, the test fails.

RX Sensitivity

An RF signal is sent to the Transceiver at the receive frequency. The level of the RF signal is set to -60 dBm. This RF signal is modulated by a 1 kHz tone at the deviation level of 60% of the Transceiver's rated deviation.

The operator is prompted to adjust the Transceiver's volume until the audio output power reaches the Transceiver's rated audio output power.

The RF level is adjusted to the level specified. The SINAD reading of the Transceiver's audio output is measured. If the SINAD reading is not within specifications, the test fails.

RX RF Bandwidth

An RF signal is sent to the Transceiver at the receive frequency. This RF signal is modulated by a 1 kHz tone at the deviation level of 60% of the Transceiver's rated deviation.

The level of the RF signal is set to -60 dBm. The operator is prompted to adjust the Transceiver's volume until the audio output reaches the Transceiver's rated audio output power.

The level of the RF signal is set to 6 dB greater than the receiver's sensitivity level. The RF signal frequency is increased from the receive frequency until the audio output SINAD reading becomes 12 dB. This RF frequency change is the receivers upper bandwidth.

The RF signal frequency is decreased from the receive frequency until the audio output SINAD reading becomes 12 dB. This RF frequency change is the receivers lower bandwidth.

If the lower bandwidth and the upper bandwidth are not within specifications, the test fails.

RX Squelch Threshold

An RF signal is sent to the Transceiver at the receive frequency. The level of the RF signal is set to -60 dBm. This RF signal is modulated by a 1 kHz tone at the deviation level of 60% of the Transceiver's rated deviation.

The operator is prompted to adjust the Transceiver's volume until the audio output reaches the Transceiver's rated audio output power.

The RF level is reduced to -130 dBm and the operator is prompted to adjust the squelch control until the Transceiver is squelched off.

The RF signal level is increased until the audio output is constant and not less than 10 dB below the rated audio output level. If the adjusted RF signal level is not within specifications, the test fails.

The RF signal level is reduced to -130 dBm and the audio output level is measured. If the audio output level is less than 40 dB below the rated audio power, the test fails.

RX Tight Squelch

An RF signal is sent to the Transceiver at the receive frequency. The level of the RF signal is set to -60 dBm. This RF signal is modulated by a 1 kHz tone at the deviation level of 60% of the Transceiver's rated deviation.

The operator is prompted to adjust the Transceiver's volume until the audio output reaches the Transceiver's rated audio output power.

The RF level is reduced to -130 dBm and the operator is prompted to adjust the squelch control to the maximum position.

The RF signal level is increased until the audio output is constant and not less than 10 dB below the rated audio output level. If the adjusted RF signal level is not within specifications, the test fails.

RX Audio Response

An RF signal is sent to the Transceiver at the receive frequency. The level of the RF signal is set to -60 dBm. This RF signal is modulated by a 1 kHz tone at the deviation level of 60% of the Transceiver's rated deviation.

The operator is prompted to adjust the Transceiver's volume until the audio output reaches 50% of the Transceiver's rated audio output power.

The deviation of the 1 kHz tone is reduced to a level of 20% of the Transceiver's rated deviation. The audio output level is recorded as the reference level.

The modulating tone frequency is changed to 300 Hz, 1.7 kHz, 2.4 kHz and 3 kHz. For each frequency, the output audio level is measured. If the output audio levels are not within specifications of a 6 dB/octive preemphasis curve, the test fails.

RX Audio Sensitivity

An RF signal is sent to the Transceiver at the receive frequency. The level of the RF signal is set to -60 dBm. This RF signal is modulated by a 1 kHz tone. The operator is prompted to adjust the Transceiver's volume to the maximum position.

The deviation of the audio tone is adjusted until the audio output level is at the Transceiver's rated audio output level. If the adjusted deviation level is not within specifications, the test fails.

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MASTER

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